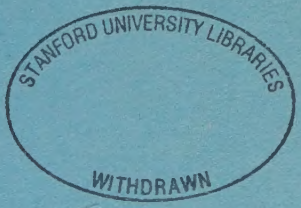
130

A STUDY OF THE GROUP METHOD OF MEASUREMENT OF SIGHT-SINGING

BY

RAYMOND M. MOSHER

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN THE FACULTY OF PHILOSOPHY, COLUMBIA UNIVERSITY



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R. M. M.

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A STUDY OF THE GROUP METHOD OF MEASUREMENT OF SIGHT-SINGING

CHAPTER I

THE PROBLEM STATED

PURPOSE OF THE STUDY

The chief aim of this study is to show what battery of group tests will give the best index to sight-singing achievement in terms of a valid criterion.

To accomplish this purpose it was necessary to formulate an hypothesis concerning the elements involved in the sight-singing process. This hypothesis stated, group tests were devised to measure the function in terms of the assumed elements. In order to establish a criterion to check the above hypothesis, an individual test was constructed which *directly* measured sight-singing ability. The desirability of directly testing a trait is a thesis that needs no special support at this time. However, individual methods are not always practical in large school systems where a lack of time and money makes more accurate procedure less expedient from an administrative standpoint. For this reason, this study aims to reveal whatever merits the group technique may have, even though the method be somewhat indirect.

PRESENT STATUS OF PUBLIC SCHOOL MUSIC

The field of public school music has enjoyed few of the benefits of research that have improved instruction in reading, arithmetic and spelling. Since experimentation in school music has been noticeably absent, improvement in teaching the subject has been slow, and advancement has lacked the assurance and stability which has characterized progress in many of the other school subjects.

In the past, goals have been set up on the basis of what adults believed desirable to be accomplished. These have been worthy in spirit, but often unattainable in actual practice. To estimate surely what can be accomplished by pupils, some objective method of measuring achievement is necessary. It is to this end that the present study is directed.

VALUE AND USES OF TESTS

A first value of testing in this almost untouched field is that the difficulty of subject matter at various grade or age levels may be ascertained. These difficulties may then be diagnosed and analyzed so that a course of study may be proposed. These findings would serve as a real basis; would give an inventory of pupil achievement upon which a scientific course of study could be formulated.

A second value of testing music achievement is for purely scientific reasons. At present judgment of performance in singing is not in any sense standardized. In some cases sheer guess would be almost as accurate as the subjective estimates given by supervisors and teachers.

In the third place, it is equally important to ascertain the degree to which certain phases of music teaching really function in the sight-reading process. For this reason there is an urgent need for an instrument to measure the trait objectively.

Finally, the answer to the practical problem of the apportionment of school time to the study of theory, in light of test results, ought to make for less waste of time on useless and meaningless material which has no transfer value.

RELATED PROBLEMS

The problems described in the preceding paragraph lead to many related questions which this study attempts to answer. Some of these are:

1. Which of the seven tests used is the best measure of sight-singing achievement?
2. What characteristics of a single test of a battery make for high correlation with the criterion?
3. In the establishment of a criterion for sight-reading ability, to what extent can the general principles of test construction be applied, and with what accuracy of results?
4. What relationship exists between achievement and native musical capacity as measured by the Seashore tests?
5. What relationship exists between achievement and general intelligence as measured by certain tests?
6. To what extent is achievement in school music due to instruction received from private teachers?

7. From the test results, what implications for more accurate grading and classification are revealed?
8. What are the relative difficulties in the elements of the sight-singing process?

CHAPTER II

SUMMARY OF PREVIOUS STUDIES

MEASURING ACHIEVEMENT IN SCHOOL MUSIC

A search for studies in the field of public school music reveals the fact that several investigators have been at work. The attack has been principally that of constructing tests which aim to measure achievement in school music.

In 1920, Frank A. Beach of the Kansas State Normal School, Emporia, Kansas, published the "Beach Standardized Music Tests." This test contains sixty-two items. From an examination of its contents, it purports to measure achievement in music in the public schools. Such elements as (1) knowledge of symbols; (2) identification of measure; (3) pitch and syllable names; (4) durative values; (5) melody correction; (6) melody writing; (7) melody identification; and (8) tone identification are measured. A manual of directions and norms is available. The norms have been established from the returns of about ten thousand tests.[1] The test items under the elements mentioned above are not grouped into separate and single tests within the whole. For example, items 23 to 28 deal with the recognition of *highness* and *lowness* of tones in a series; items 10 to 13 deal with the recognition of measure from hearing a melody played. Therefore the form of the test is such that separate scores on the several single phases are not readily available.

A more recent publication is that of Ruch and Kwalwasser.[2] The test is composed of ten separate tests, each one of which measures, independently, various elements in school music. The elements measured are (1) knowledge of musical symbols and terms; (2) recognition of syllable names; (3) detection of pitch errors in a familiar melody; (4) detection of time errors in a familiar melody; (5) recognition of pitch names; (6) knowledge of time signatures; (7) knowledge of key signatures; (8) knowl-

[1] *Report of the National Music Supervisors' Conference*, 1921.

[2] Kwalwasser-Ruch Test of Musical Accomplishment, published by Extension Division, University of Iowa, Iowa City, Iowa.

edge of note values; (9) knowledge of rest values; (10) recognition of familiar melodies from notation.

The single tests are composed of several items ranging from five to twenty-five. Weightings are indicated for each single test. The final score is the composite of the points made on the separate tests. The authors are at work on norms and the determination of reliability.

E. K. Hillbrand has published a scale for measuring achievement in sight-singing.[3] It is an individual, oral test containing six items. In tonal content, the several items include scale progressions, ascending and descending, and tonic chord progressions. The most common measure signatures are employed, namely, two-fourths, three-fourths and four-fourths. In rhythmic content, the range is narrow, involving (1) one tone to a beat; (2) a tone sustained two beats; and (3) two tones to one beat, all of which are expressed in the necessary notation when a quarter is the unit. Types of errors, such as notes wrongly pitched, transpositions, flatting, sharping, omission of notes, errors in time, are marked on the test blank by the examiner, who uses prescribed signs. Following the application of the test, the examiner may tabulate errors and thereby diagnose the individual difficulties of the pupil. A manual of directions and norms is available.

The following tests have been reported, some of which are printed, while others are in mimeographed form: Music Intelligence Test, by Glenn Gildersleeve of Rochester; Standardization Tests, devised by C. A. Fullerton of Iowa State Teachers College; Public School Music Test, by Ralph Baldwin of Hartford; and the Detroit Practice Tests, devised under the direction of S. A. Courtis and T. H. Chilvers.

MEASURING MUSICAL TALENT

The work of Carl E. Seashore is outstanding in the scientific measurement of musical talent. A complete survey of musical mind is discussed in *The Psychology of Musical Talent.*[4] Six basic capacities have been recorded on phonograph discs, the material presented furnishing measures "of the most fundamental and essential capacities of the musical mind."[5]

[3] Hillbrand Sight-Singing Test for Grades 4 to 6, World Book Co., Yonkers, N. Y.

[4] Seashore, C. E., *The Psychology of Musical Talent*, Silver, Burdett and Co.

[5] Seashore, C. E., *Manual of Instruction and Interpretations for Measures of Musical Talents*, p. 3, Columbia Graphophone Co., New York City.

The analysis of musical talent has resulted in measures based on the following assumptions:[6]

They are based on a thorough analysis of musical talent; they are standardized for content that does not need to be changed; they give quantitative results which may be verified to a high degree of certainty; they are simple and as nearly self-operating as possible; they are adapted for group measurements; they take into account practice, training, age, and intelligence; they have a twofold value in the concrete information furnished, and in the training and pleasure gained from the critical hearing of musical elements.

The phonograph records are adapted to use in the classroom, thereby permitting the experimenter to survey musical talent from the fifth grade up. *A Survey of Musical Talent in the Public Schools*,[7] represents a study of this type, in which scores on the several tests (pitch, consonance, memory, intensity and time) were compared with teacher's estimate of singing and brightness.

[6] Seashore, C. E., *Manual of Instruction and Interpretations for Measures of Musical Talents*, p. 3, Columbia Graphophone Co., New York City.

[7] Seashore, C. E., University of Iowa Studies, First Series, No. 37.

CHAPTER III

EXPERIMENTAL MATERIAL

THE GROUP-TEST

Before constructing the group-test, a survey of the subject material as represented in school texts and teachers' manuals was conducted. This study revealed that in general the body of subject material divides itself into seven phases, each supposedly contributing something to achievement in sight-singing. The seven phases are:

1. Knowledge of musical symbols, marks of expression, and general music information.
2. Recognition of scales, chords, and intervals.
3. Knowledge of measure and note values. (Duration, not pitch.)
4. Ability to identify well-known melodies when read silently.
5. Ability to write tonal figures or patterns from hearing them played on piano.
6. Ability to write rhythmic patterns from hearing them played in monotone on piano.
7. Ability to write melodies from dictation.

Since writers of school music books, and teachers' manuals accompanying them, are not in unanimity concerning the efficacy of any one of these phases over the others, an effort has been made in this study to give an answer to this question.

The group method of testing has been demonstrated to be economical of time and money, at the same time capable of giving fairly reliable indices. Achievement has been measured by group methods in arithmetic, reading, spelling and certain other subjects with a satisfactory degree of reliability. For this reason, the group method was selected as applying similarly to measuring sight-singing. It is assumed, then, that scores resulting from measures of the seven elements mentioned above are indicative of sight-singing achievement, even though the method of testing is indirect in its approach.

Description of the Group-Test

Test I is devoted to information about music. The form of the test is the recognition type, containing seventy-three items. The contents tapped by this test are (1) marks of expression, (2) note values, (3) elementary theory and notation, (4) history of music, (5) measure, and (6) scansion.

Test II. In the sight-singing process, the singer must be conscious of the melodic sequences. In general, these sequences follow three lines, namely, scale, chord and chromatic patterns.

In the case of the scale patterns, the arrangement of the whole and half steps is determined by the key signature. For this reason, the recognition of key is an important factor in adequate sight-reading.

Many of the more recent music series stress the chord approach to sight-reading. Beginning with songs built on a tonic chord sequence, the plan calls for familiarity with that chord in several keys, perhaps the nine common signatures. For this reason, knowledge of the chords is a requisite to achievement. Since most texts confine themselves to the three principal chords, the tonic, sub-dominant and dominant, this test seeks to get a measure of achievement in those fields.

Question 7 attempts to ascertain whether or not the pupil can recognize a chromatic passage, the series of notes constituting the chromatic scale ascending from middle C to C third space.

Test III. Since *measure*, and the content of the measure in reference to the signature, are of prime importance in adequate singing, this test seeks to measure achievement in ability to recognize measure values. The test contains ten items. The purpose of the test is to ascertain the pupil's ability to discriminate note values in terms of a given measure signature, each measure being incomplete. The pupil shows his knowledge of measure and note values by accurately completing the measures as directed.

Test IV. This test is perhaps the most direct in its attempt to secure a measure of sight-singing achievement. It involves the silent reading of well-known airs, the majority of which are found in school music readers, and therefore are representative of the general song literature given to children.

After the child has identified the melody, he must write its name in the blank space at the right. Aside from this ability to write a

few words, the test is free from impurities and ambiguities. It would seem to be the most accurate method of ascertaining the extent to which a child is capable of reading and getting meaning from music-symbols.

In the mind of the author, this test was considered the best test of the seven. The reasons for so evaluating it are:

1. It is *objective*, necessitating a real reading ability on the part of the one being examined.
2. It corresponds closely to the sight-reading conditions which exist in the ordinary classroom.
3. It is *direct*, involving a mental function which most closely resembles that which teachers and supervisors are endeavoring to obtain.

Tests V, VI, VII. In the preface to *Third Year Music*, page 5, Dr. Hollis Dann says, "Reading is getting thought from symbols and presupposes the ability to think in the language. Reading a melody is getting the tonal and rhythmic thought from printed symbols. As the reading of English is impossible without the power to think in English, so the reading of music is impossible without the power to think in the tone language. Notes, rests, and bars have a definite meaning only to the reader who has a definite knowledge of the tones and rhythms which these symbols represent. Rote singing must be supplemented by a systematic course in ear-training, giving the pupil the power to recognize the tones and rhythms represented, and teaching him to 'speak' the language."

To accomplish this end, Test V seeks to get an index to achievement in recognizing tonal patterns. A total of eight tonal patterns involving scale (major and minor) and chord progressions are used, all of which are written from dictation when played by the examiner on the piano.

In Test VI, rhythmic patterns are isolated from their melodic content, being played in a monotone to bring out accented and weak beats of the measure.

In Test VII, melodies are dictated which involve a combination of the foregoing elements. Two keys and three different measure signatures are used, with melodies which increase in difficulty from very easy to quite complex.

Directions for Giving the Group-Test

Test I

Look at the sample which is at the top of the page. Read to children: "Sample: The symbol ♯ is called a (1) note; (2) bar; (3) slur; (4) sharp; (5) rest. .....5..... The figure 5 is placed in the blank space because it is the figure which corresponds to the right answer in the question."

Then say, "Look at the second sample." Read: "Sample: The curved figure written on the staff is called a (1) clef; (2) bar; (3) note; (4) rest; (5) pause. .....1..... The figure 1 is placed in the blank space because it corresponds to the correct answer. Do you understand? . . . When I give the signal, begin at No. 1 and go on down the page, then to page 2, and so on, answering all the questions you can. Stop when you finish No. 73. Ready! Begin!"

After 25 minutes say, "Stop. Turn to Test II."

Test II

"This is a test on keys, scales and chord names. Look at the sample. . . . You will see that we have a staff, a clef mark, and two notes which are located on the second space. Just above the two notes is a curved line connecting them. The question is: The name of the curved line which connects the two notes on the same staff degree is a ....., and the answer, '*tie*' is written in the blank space. *Tie* is written on the blank at the right of the page.

"Below you will see some questions to be answered on this page. If you do not know the answer to a question, go on to the next and do the best you can. Do No. 1 first, then No. 2, and so on, down the page, until I say 'Stop.' Ready! Begin!"

After three minutes say, "Stop. Turn to Test III." Pause.

Test III

Read aloud: "This is a test to see how well you know measure signatures and notes. Look at the sample at the top of the page. In it there are a clef, three-fourths measure signature, and two quarter notes. If you look carefully at the measure [illegible] it will tell you there should be three quarter notes [illegible] lent to fill the measure. Complete the measure [illegible]

What kind of note would complete the measure? . . . Yes, a quarter note.

"There are ten questions on this page. Something is to be done to fill the measures. Read the directions for each one carefully, then look at the measure signature and do exactly what it says, using the proper kind and number of notes. Begin with No. 1 and go down the page. Be sure to notice the measure signature. Work until I call 'Stop.' Ready! Begin!"

After four minutes say, "Stop. Turn to Test IV."

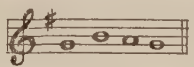
Test IV

"Now look at the following well-known melody. (America.) Let us sing it together to see if we know what it is." Give the tonic, and direct the children to hum or sing. "What is the name of the song? ("America"; or "God save the King"; or "My Country 'Tis of Thee.") Now look at the following well-known melodies. *Sing* the first *to yourself*, but not aloud. As soon as you can think of its name, write the name, or the first line of the song, on the blank space; and then do the same for No. 2, and No. 3, and so on down the page. Go quickly from one song to the next, and name as many as you can. When I give the signal you may begin. Ready! Go!"

After five minutes say, "Stop. Turn to Test V."

Test V

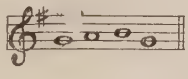
"This is a test to see how well you can write what you hear. Listen carefully while I play a short melody." Play:



"Can you think it to yourself? I shall play it again. (Play melody.) It begins on G, and that is the tonic or *do*. Can you think where the notes would go which would give a staff picture of what I played? . . .

"Now look at the sample which is at the top of the page. I will play the melody again while you watch the notes. It begins on the second line and then skips up; then comes down the scale. (Play it.)

"Now I shall play another melody." Play:

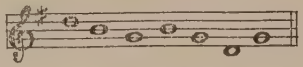


"Sing the first tone. Now think of the way the melody goes. You will hear it go up as far as the third tone, and then it skips down to the first tone again. (Play it.) On the blank staff at the very top of the page, write a whole note on G, the second line; then write whole notes on the second space (pause); on the third line (pause); and then on the second line again. This is the staff picture of what I played. (Play it again.)

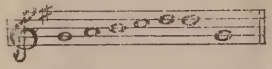
1. "Listen carefully to the following tone patterns all in the key of G major. This is the principal chord, and this is the home tone. (Play.) Now I will play the first pattern:

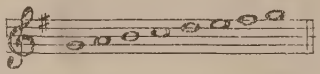
(Play it twice, saying 'Again' between renditions.) Write it on the first staff, using only whole notes like the sample. (Pause for *30 seconds*.) Now I will play the exercise again so that you may test what you have written. Watch!" (Pause *10 seconds*.)

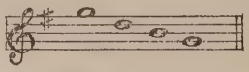
2. "Remember the home tone. (Play tonic.) Now write this pattern on the second staff:

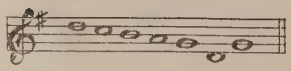


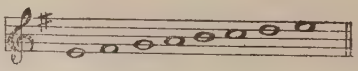
(Pause *30 seconds*.) Now I will play the exercise again so that you may test what you have written. Watch!" (Play it; then pause *10 seconds*.)

3. Idem. 

4. Idem. 

5. Idem. 

6. Idem. 

7. Idem. 

8. Idem.

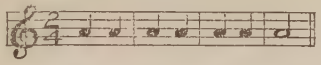
Turn to next test.

Test VI

"This is a test in hearing accented tones, unaccented tones, and tones held for two beats and two tones on one beat. I will play a pattern for you, while you watch the picture of it at the top of the page." Play:

"You heard 'Accent, unaccent,' followed by another set like it, then a tone held two beats and sustained another two beats. When you hear 'Accent, unaccent,' it signifies two-part measure. Write in two-fourths measure at the beginning. A bar is placed before accented tones. (Play exercises again several times to demonstrate this point.) Watch while I play it several times.

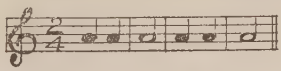
"Listen carefully to the following rhythmic patterns. On the staff, write the notes in the second space representing the rhythmic pattern. Put the correct measure signature at the beginning after you have discovered the number of accented and unaccented beats. All of the patterns will need more than one measure. Ready for the first pattern." (Play.)

1. 

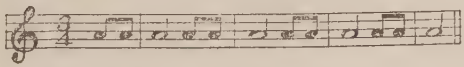
After one minute say, "Now I shall repeat the exercise so that you may test what you have written. Ready!"

Play it; pause *10 seconds*, then say: "Do not forget the measure signature at the beginning. (Pause.) Now ready for No. 2.

2. "Remember to listen for the accent and the unaccent. This is No. 2. (Play it.) Now I will play it again. (Play it.) Write! (Pause one minute.) Now I shall repeat the exercise so that you may test what you have written. Ready!" (Play it.) Pause ten seconds. Then say, "Now ready for No. 3."



3. Idem.

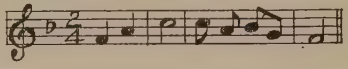
4. Idem. 

5. Idem.

"Now turn to Test VII."

Test VII

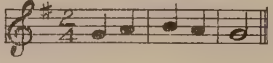
"In this test, you know the key and measure signature, also the number of measures. All are written for you at the beginning of the exercises. Look at the sample. The key is F Major, and the measure signature is two-fourths. This is the tonic chord and home tone (or 'do'). (Play.) (Play the sample twice.)



"When I play the melodies listen for the accent. You should write the melody carefully, always having the tone which has strong accent after a bar.

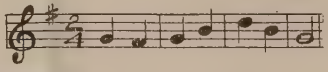
"When the melody is played, observe how the tones go; either thinking how they would look on the staff, or thinking the syllable names.

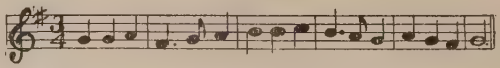
1. "Listen to what I am going to play, and after the second repetition, write it on the staff after Figure 1." (Play exercise twice.)



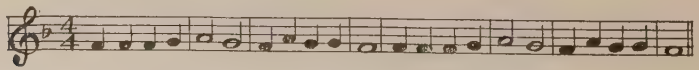
"Write that on the staff." (Pause one minute.)

"Now I shall repeat the exercise so that you may check what you have written. (Pause ten seconds for checking.) Ready for No. 2."

2. Idem.  Except pause 15 seconds for checking.

3. Idem.  Except pause 2 minutes for writing, 15 seconds for checking.

4. "Listen to what I am going to play, and after the second repetition write it on the staff after figure 4. This exercise is in the key of F major, and the measure signature is 4–4. This is *do*. (Play it. Play exercise twice.)



Write that on the staves for figure 4. (Pause three minutes.)

"Now I shall repeat the exercise so that you may check what you have written. (Pause 15 seconds for checking.)

"Close your booklets, and wait for the signal to pass them."

Directions for Scoring the Group-Test

In Test I (General Information), each question is evaluated at one point.

In Test II, partial credit is given on the first four questions: 1 credit for the scale letter and 1 credit for the scale mode—2 credits in all. The other five questions score 2 credits each.

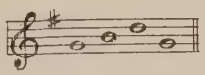
In Test III, the measure completion tests are credited 1 point each.

In Test IV, the credit value for each melody is 2 points.

In Test V, the melodic patterns are scored as follows:

Pattern 1: Initial tone, 1 point; Interval, 6 points
Pattern 2: Initial tone, 1 point; Interval, 6 points
Pattern 3: Initial tone, 1 point; Interval, 6 points
Pattern 4: Initial tone, 1 point; Interval, 7 points
Pattern 5: Initial tone, 1 point; Interval, 3 points
Pattern 6: Initial tone, 1 point; Interval, 6 points
Pattern 7: Initial tone, 1 point; Interval, 7 points
Pattern 8: Initial tone, 1 point; Interval, 7 points

Total.....56 points

Sample: 

There are three intervals in the above sample, hence 3 points. G is the initial tone, valued at 1 point; total, 4 points.

In Test VI, the rhythmic patterns are scored 3 points each:

a. Identification and writing of measure sign, 1 point.

b. Correct note value and completed measures, 2 points.

In Test VII, the melodic dictation involves the following factors with their credit values:

a. The complete melody..... 2 points.

b. The rhythmic structure without error..... 2 points.

THE INDIVIDUAL-TEST

The Necessity for a Criterion

The individual singing test was constructed for the purpose of establishing a criterion for singing achievement. The necessity

for a criterion has been recognized by investigators in other fields, and it seemed that no reliance could be placed on the group-test results until they were interpreted in the light of an intelligible and valid criterion.

Of the criteria which have been used in evaluating intelligence tests, one is teachers' judgments. Since the teachers were not in the habit of rating pupils in terms of their sight-singing ability, wide differences in standards of judging were unavoidable in the application of this criterion to our problem. Much confusion was due to the fact that grade standards are ill defined, if defined at all. Because of the fact that teachers' judgments are not always reliable, it seemed necessary to devise a valid and reliable individual singing test which would secure objective measures of the function.

General Description of the Individual-Test

The individual singing test was devised for use in measuring the actual singing achievement of school children. It was necessary therefore to construct a test which would measure the lowest level of achievement as well as the highest, in units which were refined enough to allow even a slight difference to be shown.

After an inventory of singing elements was made, one form of the test was arranged and subsequently mimeographed. The pupil was supplied with a specially prepared copy, clearly executed in India ink so as to be free from the imperfections of the multigraphing process. The examiner used the mimeographed copy as a checking sheet.

Construction of the Individual-Test

In singing, the performer recognizes the key and measure signatures. When this has been accomplished, he proceeds to observe the various units as the phrases and the measures. Therefore, one of the prepotent elements in a sight-reading situation is the prompt recognition of key, with its attendant implication for the tonic or *One* of the scale in that particular key. In addition, an equally important element is the interpretation of the measure signature, identifying the nomenclature which denotes the number of beats in a measure and the kind of note which is the unit for the beat. In singing, all of these elements must be adequately translated into vocal utterance.

Since the music offered in any school reader is written in many keys and in varying measures and rhythmic and tonal patterns, the test items were selected so as to cover these important factors. To this end, twelve exercises involving the more frequently met problems in school music were arranged in order of difficulty, as judged by the writer. The test is appended. These exercises have been analyzed in terms of the problems introduced as follows:

Test I

1. Theory, recognition of key sign (F Major), leading to the location of the tonic.
2. Pulse—two part, with a quarter note as the unit for a beat.
3. Durative values:
   a. One tone to a beat.
   b. One tone sustained two beats.
4. Pitch:
   a. Tonic chord progression, ascending and descending, involving spaces on the staff.
   b. Scale descending with a repeated tone at "two."

Test II

1. Theory, recognition of key. (Same as in Test I.)
2. Pulse—three part, with a quarter note as the unit for a beat. (Same as in Test I.)
3. Pitch:
   a. Tonic chord, progressions, ascending and descending (1–3–5; 5–3–1).
   b. Scale sequence with a repeated tone at three.

Test III

1. Theory:
   a. Recognition of key sign (E flat Major).
   b. Quarter rest.
2. Pulse. (Same as in Test I.)
3. Durative values. (Same as in Test I.)
4. Pitch—scale progression descending, with repeated tones.

Test IV

1. Theory:
   a. Recognition of key (E Major) with location.
   b. Anacrusis.

2. Pulse—four part, with a quarter as the unit for a beat.
3. Durative values: one tone to a beat throughout.
4. Pitch—scale progression ascending and descending, with *five* repeated in the ascending progression.

Test V

1. Theory:
   a. Recognition of key (E flat Major). (Same as in Test III.)
   b. Anacrusis.
2. Pulse. (Same as in Test I.)
3. Durative values. (Same as in Test I.)
4. Pitch:
   a. Scale progression ascending and descending with repeated tones and diatonic progression.
   b. The skip of five-one.

Test VI

1. Theory:
   a. Recognition of key (C Major) and location of the tonic.
2. Pulse. (Same as in Test IV.)
3. Pitch:
   a. The tonic chord skips (5–8; 8–5). (cf Test VIII on next slide.)
   b. Diatonic progressions.
   c. Repeated tones.
   d. More difficult intervals.
      (1) two-six.
      (2) six-eight.
4. Durative values:
   a. One tone sustained three beats.
   b. Similar problems found in preceding exercises.

Test VII

1. Theory:
   a. Recognition of key (G Major) and location of tonic.
   b. The quarter rest (between segments of the tonic chord).
   c. Anacrusis (in a new key).
   d. The quarter rest, following a half note.
2. Pitch:
   a. Tonic chord (segment).

b. Diatonic scale progression from five to one.

3. Durative values:
   a. One tone to a beat.
   b. One tone sustained two beats.
   c. Period of rest.
4. Pulse. (Same as in Test II.)

Test VIII

1. Theory:
   a. Recognition of signature and key (D Major).
   b. Location of tonic.
2. Pitch:
   a. Tonic chord skips (5–8; 8–5).
   b. Diatonic scale progression.
3. Durative values:
   a. Half notes within a phrase, i.e., not at the end of a phrase.
   b. Scale progression with half note and quarter note figures; viz., "𝅗𝅥 – ♩."
4. Pulse—three part, with a quarter as the unit for a beat.

Test IX

1. Theory:
   a. Key signature, measure sign and the location of tonic. (Same as in Test VII.)
   b. Marks of expression, viz., *crescendo* and *diminuendo*.
   c. Problems of singing one syllable of word to two tones.
   d. Two tones to a beat on second pulse of measure.
2. Pulse. (Same as in Test I.)
3. Durative values:
   a. Eighth notes.
4. Pitch:
   a. Repeated figures in scale progression.
   b. Short scale figures descending followed by scale figures "ascending or descending."
   c. *Five* as a temporary tone of repose.

Test X

1. Theory:
   a. Recognition of key. (Same as in Test I and Test II.)

b. The identification of the nomenclature which denotes two tones to one beat (eighth notes).

2. Pitch:
   a. Tonic chord figures:
      (1) 1–3–5
      (2) 3–3–1–1
      (3) 1–1–3–3
   b. Scale progression with repeated tones.
   c. Interval, 2–5 (new), with five as a tone of repose.
3. Durative values:
   a. Two tones to one beat when a quarter is the unit for a beat.
   b. Tone sustained two beats (half note).
   c. Period of rest (quarter rest).

Test XI

1. Theory:
   a. Recognition of key. (Same as in Test III.)
   b. Anacrusis.
   c. Eighth notes to express two tones to one beat (introduced in Test X).
2. Pitch:
   a. New intervals as follows:
      (1) 1–4
      (2) 3–6
      (3) 3–8
      (4) 5–4–6
      (5) 5–1
   b. Scale progressions as in preceding exercises.
3. Durative values—no new problems, except as combined with new tonal problems.
4. Pulse. (Same as in Test IV.)

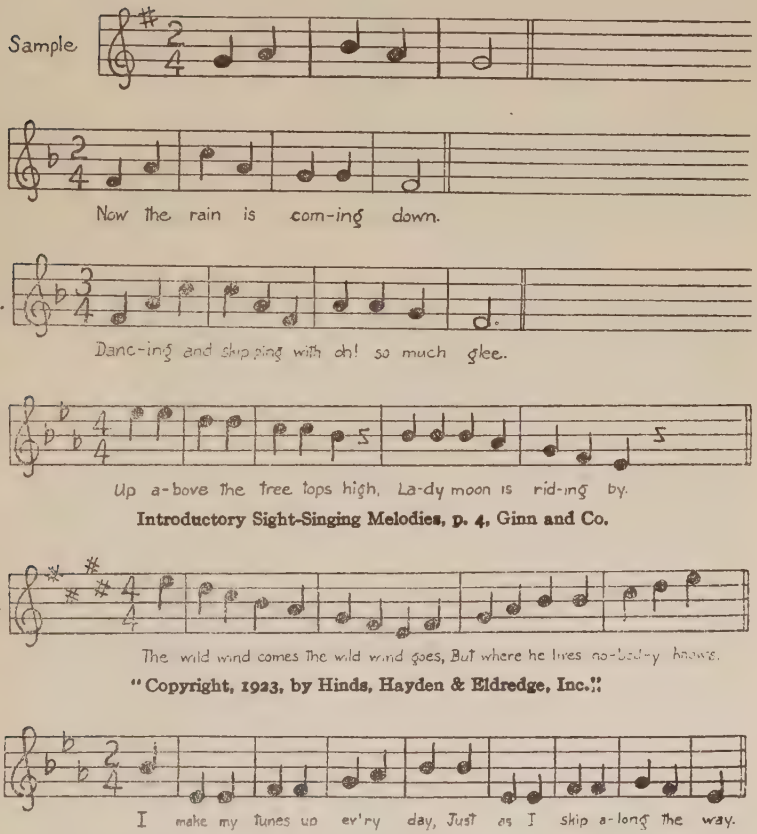
Test XII

1. Theory:
   a. Recognition of key. (Same as in Test VIII.)
   b. Six-eighth measure.
2. Pitch:
   a. New intervals:
      (1) 5–2
      (2) 6–8

b. Scale progressions.

3. Durative values:
   a. The dotted quarter note to express a tone sustained for three beats.
   b. The quarter note to express a tone sustained two beats.
   c. An eighth note to express one tone to a beat.
4. Pulse:
   a. Six-part measure with an eighth note as the unit for a beat.

INDIVIDUAL SINGING TEST[1]


Sample
1.
Now the rain is com-ing down.
2.
Danc-ing and skip-ping with oh! so much glee.
3.
Up a-bove the tree tops high, La-dy moon is rid-ing by.

Introductory Sight-Singing Melodies, p. 4, Ginn and Co.

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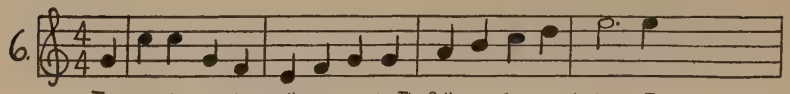
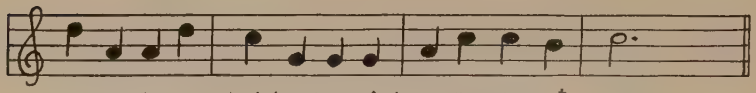
[1]The complete test is on file in manuscript in the library, Columbia University, New York City. Test items 7 and 11 are omitted here.





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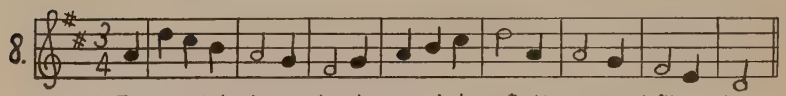

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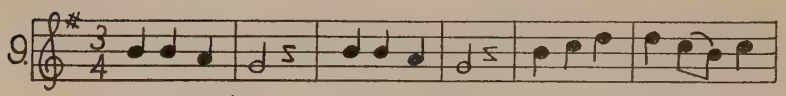

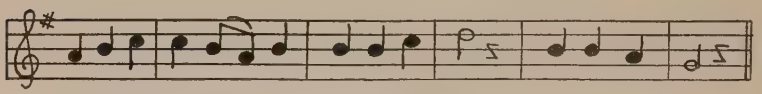

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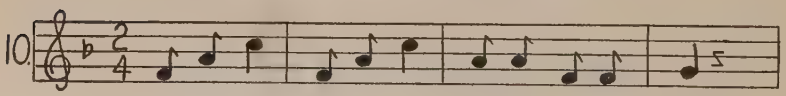

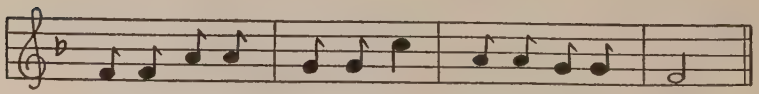

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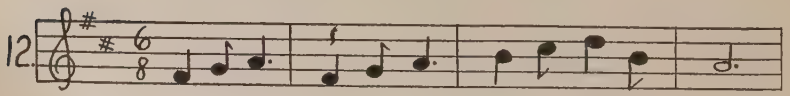

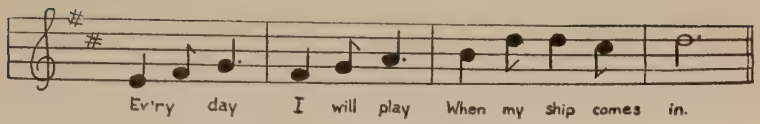

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TABLE I

NUMBER AND PERCENTAGE OF MEASURES JUDGED CORRECT, INCORRECT AND UNSCORED

		N[1]	Number			Percentage		
			+	0	†	+	0	†
Ex. I	Tone	60	58	1	1	96.6	1.6	1.6
	Rhythm	60	54	5	1	90.0	8.3	1.6
Ex. II	Tone	60	57	3	0	95.0	5.0	0.0
	Rhythm	60	56	4	0	93.3	6.7	0.0
Ex. III	Tone	120	87	26	7	72.4	21.6	5.8
	Rhythm	120	85	10	25	70.8	8.3	20.8
Ex. IV	Tone	75	51	3	21	68.0	4.0	28.0
	Rhythm	75	47	0	28	62.6	0.0	37.33
Ex. V	Tone	135	75	35	25	55.5	25.8	18.5
	Rhythm	135	98	0	37	72.5	0.0	27.4
Ex. VI	Tone	135	104	4	27	77.0	2.9	20.0
	Rhythm	135	105	3	27	77.7	2.2	20.0
Ex. VII	Tone	75	12	50	13	16.0	66.6	17.3
	Rhythm	75	54	6	15	72.0	8.0	20.0
Ex. VIII	Tone	135	16	103	16	11.7	76.2	11.7
	Rhythm	135	91	12	32	67.3	8.8	23.7
Ex. IX	Tone	180	10	144	26	5.5	80.0	14.4
	Rhythm	180	128	4	48	71.1	8.2	26.6
Ex. X	Tone	120	90	9	21	75.0	7.5	17.5
	Rhythm	120	102	3	15	85.0	2.5	12.5
Ex. XI	Tone	135	14	95	26	10.3	70.3	19.2
	Rhythm	135	96	7	32	71.1	5.2	23.7
Ex. XII	Tone	120	101	4	15	84.2	3.3	12.5
	Rhythm	120	103	1	16	85.8	8.3	13.3

[1] N = Total number of estimates possible, there being fifteen judges.
+ = Judged as correct.
0 = Judged as incorrect.
† = Unscored measures.

Preliminary Study to Evolve Scoring Method

At the outset it was obvious that the method of scoring to be used on the individual test would be the examiner's instantaneous judgment of the utterance given by the pupil. The question arose: To what extent is such a judgment accurate? To answer this question, two preliminary experiments were tried.

A. Fifteen students in the Psychology of Music class, Teachers College, coöperated by scoring a rendition of the twelve tests. These students were advanced in music education.[1]

The writer arranged for the singing of these exercises before the class by one who had not seen or studied the material in order that the degree of agreement among those scoring the rendition could be ascertained. Each judge was supplied with a mimeographed copy of the exercises upon which he indicated his estimate according to the following directions:

1. Score each measure for tonal and rhythmic accuracy.
2. If the tonal elements of measure "1" are correct, place a plus sign immediately above the measure; if incorrect, place a minus sign above the measure. Idem for all measures.
3. If the rhythmic elements of measure "1" are correct, place a plus immediately below the measure; if incorrect, place a minus below the measure. Idem for all measures.
4. Use your judgment concerning the accuracy of the rendition.

From the above paragraphs, it is evident that the unit for scoring was the measure. In Test I, there are four measures with a corresponding number of points for tone. Since there were fifteen students scoring, there would be a total number of sixty responses possible. In a like manner, there would be sixty responses possible for rhythm. Table I shows the total number of score responses possible; the number of measures scored *correct*, the number of measures scored *incorrect*, and the percentages of each.

Conclusions:

1. The judges indicated the impossibility of accurately scoring each measure with either plus or minus signs, but—

[1] In years spent in musical study, they ranged from three and a half years to seventeen years, with an average for the entire group of 9.4 years. It is obvious therefore that they were musicians of high rank, in view of their years of special training and study.

2. The results show a high percentage of agreement in the correct and incorrect measures.

3. In general, competent musicians are in fair agreement in judging the vocal utterance of a singer.

B. The same fifteen students coöperated a second time in scoring a rendition of Tests VII, VIII, IX, X and XI. The vocalist sang from a score in which were incorporated deviations of tone and rhythm from the original exercises. In this way it was possible to ascertain measure by measure, the accuracy with which each judge was *capable of discriminating* the correct or incorrect response. The following directions for scoring were given:

1. If the tonal elements of a measure are incorrect, place a minus (−) above that measure.
2. If the rhythmic elements of a measure are incorrect, place a minus (−) below that measure.
3. If the measure is entirely correct, it should not be marked in any way.

Each judge was given a mimeographed copy of the exercises upon which he checked the incorrect measures.

Conclusions:

1. In contrast with the scoring method of the first preliminary experiment, the judges indicated the feasibility of the simplified scoring as used in this situation, measure for measure.

2. The results (Table II) show a high percentage of correct judgments.

3. The average of the correct judgments of tone, measure for measure, is 85.1.

4. The average of the correct judgments of rhythm, measure for measure, is 85.5.

5. The total objectivity of the exercises (composite scores) is shown by the fact that the mean score, obtained from sixteen judgments, is 75.68, with a standard deviation of 2.75. An entirely accurate scoring would have yielded 76.

6. It appears reasonable to infer that this method of scoring by competent judges is a more accurate method of scoring sight-reading achievement than the subjective estimates of grade teachers.

7. It also appears reasonable to infer that the writer, who was more familiar with the test than any of the judges, and who

TABLE II

PERCENTAGE OF CORRECT JUDGMENTS, MEASURE BY MEASURE, OBTAINED FROM FIFTEEN ADVANCED MUSIC STUDENTS ON A RENDITION OF FIVE EXERCISES

Correct Judgments			Correct Judgments		
Exercise	Measure	TONE	Exercise	Measure	RHYTHM
Ex. VIII		100.0%	Ex. VIII		100.0%
Ex. IX	1–4	100.0%	Ex. IX	1	100.0%
	5	76.4		2	88.7
	6	82.3		3	100.0
	7	53.0		4	94.2
	8	59.0		5	35.2
	9	94.0		6	64.8
	10	94.0		7	76.5
				8	41.1
				9	100.0
				10	88.7
Ex. X	1	94.2%	Ex. X	1	100.0%
	2	92.2		2	100.0
	3	76.4		3	47.0
	4	23.5		4	82.4
	5	94.2		5	100.0
	6	82.3		6	82.4
	7	88.2		7	82.4
	8	100.0		8	5.8
Ex. XI	1	82.4%	Ex. XI	1	100.0%
	2	76.4		2	94.2
	3	70.5		3	94.2
	4	58.8		4	11.7
	5	94.2		5	88.3
	6	94.2		6	100.0
	7	82.4		7	100.0
	8	88.3		8	76.4
	9	100.0		9	100.0
Ex. XII	1–4	100.0%	Ex. XII	1–4	100.0%
	5	23.5		5	94.2
	6	17.6		6	100.0
	7	100.0		7	94.2
	8	100.0		8	76.5

scored the singing without error, could score the singing of school children in an objective manner and with a high degree of accuracy.

Directions for Administering the Individual Test

The preliminary experiments just described disclosed suitable methods of scoring. In addition, the manner of administering

the test was evolved as a result of discussions with the students. The following paragraphs indicate the procedure used when the test was applied to the children in the grades.

To give the test, first write the name of pupil, the grade, and school at the top of the page. This page is to be used by the examiner to check the errors made by the pupil. Then present the pupil with another copy, from which he is to read. Say to the pupil, "I want you to sing a few exercises for me. I will show you what I mean." (Pause).

"Look at the sample. This is the tonic or 'do.' (Sound it on chromatic pitch pipe.) I can sing the exercise in any one of the three ways, with 'la-la-la' (illustrate), with 'do, re, mi, syllables (illustrate), or with the words. . . . (illustrate). Now, I wish that you would sing Exercise 1 for me in any one of the three ways. You may choose for yourself. Do you understand?" (If the child does not understand, make it clear to him just what he is to do.)

1. Then sound the tonic, and say, "This is *do* for Test I. Begin!"
2. Test II. Sound *do* on the chromatic pipe and say, "This is *do* for Test II. Begin!"
3. Test III. Sound *do* on the chromatic pipe, then say, "This is *do* for Test III. Begin!"
4. Test IV. *Idem.*
5. Test V. Sound *do* on chromatic pipe, then say, "This is *do* for Test V, but this exercise does not begin on *do*. Be careful to get the correct tone. I will give you *do* again."
6. Test VI. *Idem.*
7. Test VII. *Idem.*
8. Test VIII. *Idem.*
9. Test IX. *Idem.*
10. Test X. *Idem.*
11. Test XI. *Idem.*
12. Test XII. *Idem.*

Directions for Scoring the Individual Test

The results are recorded as follows:

1. If any tonal element is incorrectly uttered, place a minus above that measure.

2. If any durative value is incorrectly expressed, place a minus below that measure.
3. Record the total number of measures rendered tonally correct.
4. Record the total number of measures rendered rhythmically correct.
5. The summation of the two scores above is the individual singing score.
6. Have the child continue until he misses two tests consecutively.

SEASHORE TESTS

In order to get a measure of the musical capacity of the pupils, the Seashore Tests were administered to the Washington, D.C., pupils. The scores on the five separate Seashore Tests were correlated with the scores of the Mosher Group-Test in order to ascertain the degree of relationship existing between them.

INTELLIGENCE RATINGS

Where intelligence ratings were available, they were used to ascertain the correlation between mental age and achievement on the group-test. In many instances the pupils had been given two group-tests. In such cases the two intelligence quotients were averaged and multiplied by the chronological age to obtain the mental age. With this procedure, it was believed a more accurate rating was secured.

CHAPTER IV

EXPERIMENTAL RESULTS

INTERCORRELATIONS

1. The group-test was given to 723 children from grades five to eight in three communities, namely, Washington, D.C., San Jose, and Mountain View. The two last mentioned schools are located in California. The three schools in the city of Washington represent a typical urban situation. The San Jose (California) children represent a typical school population of a city of about 50,000. Mountain View (California) represents a rural school in a rather thickly settled fruit-raising section of western-central California.

In the first two cities mentioned, music supervision of a high type is given in the schools. In addition, the children are taught, usually, by teachers who have shown more than average ability in music. In Mountain View, the music instruction is carried on by a building teacher. Therefore, in no case was the test applied where the children had not had the benefit of fairly expert teaching, and in the great majority of cases, teaching under supervision.

The intercorrelations (Pearson Product-Moment Method) among scores on the seven single tests constituting the group-test when applied to these three school population samplings are shown in Table III.

TABLE III

INTERCORRELATIONS—GROUP-TEST

(723 CASES)

	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Test 1	----	----	----	----	----	----
Test 2	.5596	----	----	----	----	----
Test 3	.4904	.3580	----	----	----	----
Test 4	.4254	.4922	.2217	----	----	----
Test 5	.5308	.5579	.3561	.4886	----	----
Test 6	.4639	.2726	.3051	.2355	.3631	----
Test 7	.4709	.4768	.3508	.4001	.5036	.3953

2. In establishing a criterion as well as the validity of the group-test, the scores of 78 pupils (unselected) from the Washington group were combined with the scores of 50 pupils (unselected) from the San Jose group. Grade location was ignored. The teachers from the several classrooms were asked to send four, five, or six pupils, taking every seventh one. In all, there were 128 pupils in this special group. These were given the individual singing test. The intercorrelations among the seven single tests constituting the group-test were computed and are shown in Table IV.

TABLE IV

INTERCORRELATIONS—GROUP-TEST

(128 CASES)

	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Test 1	----	----	----	----	----	----
Test 2	.5455	----	----	----	----	----
Test 3	.4960	.4766	----	----	----	----
Test 4	.3477	.2886	.2983	----	----	----
Test 5	.5004	.5038	.4363	.4587	----	----
Test 6	.4370	.2849	.3284	.2652	.3369	----
Test 7	.4278	.3822	.4315	.4082	.5176	.4300

In general, the raw intercorrelations in Tables III and IV show close agreement, there being greater differences in the following correlations:

Test 1 and Test 4	Test 2 and Test 7
Test 2 and Test 3	Test 3 and Test 5
Test 2 and Test 4	Test 3 and Test 7

Since the group of 128 pupils is a random sampling from the larger group of 723, it is assumed that the relationships appearing in the former will hold, within certain limits, for the latter.[1]

From the intercorrelations shown in Tables III and IV, it is probable from the rather low coefficients that the separate tests supplement rather than duplicate each other.

RELIABILITY OF THE GROUP-TEST

Kelley says: "If but a single form of a test is available it may be possible to divide it into comparable halves; for example, one

[1] Thorndike, E. L., *Mental and Social Measurements*, p. 184, Teachers College, Columbia University.

half composed of the odd, and the other half the even exercises, and calculate the reliability of coefficient of the half form, $r_{\frac{1}{2}\frac{I}{II}}$ and then by formula obtain the reliability coefficient of the single test."[2] The following formula (Spearman-Brown) is indicated:

$$r_{II} = \frac{2r_{\frac{1}{2}\frac{I}{II}}}{1 + r_{\frac{1}{2}\frac{I}{II}}}$$

Since the correlation (723 cases) of the odds with the evens is .90908 ± .004, the computation of the reliability coefficient by the above formula would yield .9523 ± .00202.[3]

This coefficient is high,[4] but it is not in itself as indicative of high reliability as would be somewhat lower coefficients secured from a group of children within a single grade.[5]

Therefore, the following raw correlations (odds with evens) and the Spearman-Brown coefficients of reliability with their probable errors are shown for the several grades:

Grade	Raw Correlation	Reliability Coefficient	P.E.*
Grade 5	.8016	.8898	± .0181
Grade 6	.682	.8109	± .0546
Grade 7	.881	.9367	± .0159
Grade 8	.899	.9468	± .0132

* Shen's formula

AGE NORMS

Table V gives the mean score at the various ages for the group-test.

TABLE V

AGE NORMS—GROUP-TEST

Age ...	8	9	10	11	12	13	14	15	16	17
Mean .	26.5	30.98	38.27	46.22	56.18	58.39	48.91	50.38	43.5	42.5
N	7	35	75	115	164	166	107	36	19	2

[2] Kelley, T. L., *Statistical Method*, pp. 205–206, Macmillan Co.

[3] The formula used to compute the P.E. of the Spearman-Brown formula is suggested by Mr. Eugene Shen, (*Jr. Educ. Psych.*, Vol. XV, No. 7, p. 462).

[4] McCall, W. A., *How to Measure in Education*, p. 393, Macmillan Co.

[5] Pintner, R., in *Jr. Educ. Psych.*, Vol. XV, No. 8, p. 479.

The norms indicated above do not take into account the selective factor which operates at eight and nine years and at thirteen years and thereafter. Hence, these norms are not usable in calculating a musical age, or in making certain comparisons.

GRADE NORMS

Table VI gives the mean score for the group-test in the various grades.

TABLE VI

GRADE NORMS—GROUP-TEST

Grade	5	6	7	8
Mean	27.44	37.75	53.46	68.21
N	136	135	223	229

CONSTANCY OF THE INDIVIDUAL-TEST

It is customary in speaking of the reliability of a test to show whatever correlation exists between two forms of the test. Since but one form of the individual-test was used in this study, the experimenter gave the test on two occasions to a group of 78 children, within the limits of one week. It is assumed, therefore, that the practice effect was equal in all cases. The high scores were obtained by the same pupils in both instances and with a narrow average difference. These were chance differences rather than second performances being constantly better.

As stated above, each child in the group of 78 took the individual singing test on two occasions. In scoring the two blanks according to directions in Chapter III, pages 27-28, the resulting coefficient of correlation was .931. For purposes of comparison, the writer rescored the two sets of test blanks on the *all or none* basis; i. e., discrediting *entirely* all measures in which there were either tonal or rhythmic errors. On this scoring basis the self-correlation resulting was .913. This method was discarded because of the great number of zero scores, due undoubtedly to the coarser units. These preliminary experiments resulted in the adoption of the method described in Chapter III.

CORRELATION OF GROUP-TEST WITH INDIVIDUAL SINGING TEST

On the assumption that the individual singing test constitutes the criterion of the trait in question, the individual sight-singing scores were correlated with the group-test scores. When 78 cases (Washington) were correlated with the group-test independently, the correlation was .642. When the correlation of 50 cases (San Jose) was computed, the result was .6654. When the total number, 128, was correlated together, the result was .6485. It may be seen from these computations that the addition of as many as fifty cases to the original seventy-eight did not affect the correlation in any marked degree.

SUCCESSIVE APPROXIMATION METHOD TO WEIGHT THE TESTS

Assuming the individual singing scores to be the criterion of the child's ability to read, the next step is to determine the extent to which the seven elements of the group-test severally contribute. If singing achievement is Z_0, then Z_0 in turn equals the product of Z_1, Z_2, Z_3, Z_4, Z_5, Z_6, Z_7. The problem is: *Just how much* should these various elements be weighted in terms of the assumed criterion?

Musicians and teachers are in agreement that certain formal training in technical music contributes to adequate sight-singing. For example, drill in the recognition of key and measure, drill in writing from dictation, are mentioned in courses of study and teachers' manuals as aids in facilitating music reading. In brief, it is claimed that the pupil must be equipped with a certain adeptness in quickly analyzing the various problems in music nomenclature before marked achievement is made.

This study hopes to discover, if possible, to what degree each of these factors actually contributes. Since these seven factors are assumed to make varying contributions, the multiple correlation method may be used. Kelley[6] has developed a method of successive approximations to the values of the regression coefficient and to the multiple correlation. It is this procedure which has been used in this study.

In our problem, the variables are: 0, the criterion, being a score on individual sight-reading test and the variables (1–7) indicated

[6] Kelley, T. L., *Statistical Method*, pp. 302–308.

below, which are scores made by the children on the seven separate tests of the group-test as follows:

1. Knowledge of music-symbols (in isolation), and marks of expression, etc.
2. Recognition of scales, chords and intervals.
3. Knowledge of measure and note values.
4. Ability to identify well-known melodies when read silently.
5. Ability to write tonal patterns from dictation.
6. Ability to write rhythmic patterns from dictation.
7. Ability to write melodies from dictation.

The correlations between the scores are:

TABLE VII

VARIABLES

Variables	0	1	2	3	4	5	6
1	.3375	----	----	----	----	----	----
2	.3708	.5455	----	----	----	----	----
3	.3407	.4960	.4766	----	----	----	----
4	.4730	.3477	.2886	.2983	----	----	----
5	.6212	.5004	.5038	.4363	.4587	----	----
6	.3425	.4370	.2849	.3284	.2652	.3369	----
7	.4847	.4278	.3822	.4315	.4082	.5176	.4300

The steps in the calculation are as follows:[7]

"The symbol c will stand for the composite score according to whatever weightings are used upon the five tests; the symbols $(c-1)$, $(c-2)$, etc., stand for the composite scores upon all five tests, except test one, except test two, etc. The problem is to make r_{0c} a maximum. Treating one of the five variables as unique and obtaining a composite score on the other four, gives us a three-variable problem, the variables being 0, u, $(c-u)$, in which u stands for the unique variable, being in turn 1, 2, 3, 4, 5, and the regression equation being

$$z_0 = \beta_{0u \cdot (c-u)} z_u + \beta_{0 (c-u) \cdot u} \quad (c-u) \ldots\ldots\ldots\ldots$$

[7] Kelley, *Statistical Method*, pp. 304–305. The quotation is exact, except where Kelley has five variables, this study uses seven variables. Formulæ have been changed to agree with present problem.

"The value of the second regression coefficient will ordinarily be in the neighborhood of 1.00, but it does not enter into our present treatment. The first regression coefficient is the new weight w_{uu}, determined for z_u and is given by

$$w_{uu} = \frac{r_{0u} - r_{0\ (c-u)}\, r_{u\ (c-u)}}{k^2_{u\ (c-u)}}$$

Let s stand for the sum of the products of the correlations of the independent variables with the criterion into the weights of the independent variables, i. e.,

$$s = w_1 r_{01} + w_2 r_{02} + w_3 r_{03} + w_4 r_{04} + w_5 r_{05} + w_6 r_{06} + w_7 r_{07}$$

Let S stand for twice the sum of all product terms of the sort $w_u w_{u'} r_{uu'}$, i.e., S in our present problem is a summation of $2\times$ [21] terms as follows:

$$\begin{aligned} S = 2\,(&w_1 w_2 r_{12} + w_1 w_3 r_{13} + w_1 w_4 r_{14} + w_1 w_5 r_{15} + w_1 w_6 r_{16} + w_1 w_7 r_{17} \\ &+ w_2 w_3 r_{23} + w_2 w_4 r_{24} + w_2 w_5 r_{25} + w_2 w_6 r_{26} + w_2 w_7 r_{27} \\ &+ w_3 w_4 r_{34} + w_3 w_5 r_{35} + w_3 w_6 r_{36} + w_3 w_7 r_{37} + w_4 w_5 r_{45} \\ &+ w_4 w_6 r_{46} + w_4 w_7 r_{47} + w_5 w_6 r_{56} + w_5 w_7 r_{57} + w_6 w_7 r_{67}) \end{aligned}$$

Let $2S_u$ stand for the sum of those terms in S ($2\times$ [6]) in number in our present problem) which involves w_u. Thus S is equal to the sum of the S_u, or in the present problem,

$$S = S_1 + S_2 + S_3 + S_4 + S_5 + S_6 + S_7$$

and finally let Sw^2 stand for the sum of the squares of the weights. That is,

$$Sw^2 = w^2_1 + w^2_2 + w^2_3 + w^2_4 + w^2_5 + w^2_6 + w^2_7$$

"We readily obtain by formulas (163) and (149)

$$\sigma_c = \sqrt{Sw^2 + S} \quad \text{(Standard deviation of the } c \text{ composite score)}$$

$$r_{0c} = \frac{s}{\sigma_c} \quad \text{(Correlation of criterion with the } c \text{ composite score)}$$

$$\sigma_{c-u} = \sqrt{Sw^2 + S - w^2_u - 2S_u} \quad \text{(Standard deviation of the } c-u \text{ composite score)}$$

$$r_{0(c-u)} = \frac{s - w_u r_{0u}}{\sigma_{(c-u)}} \quad \text{(Correlation of the criterion with the } c-u \text{ composite score)}$$

$$r_{u(c-u)} = \frac{S_u}{w_u \sigma_{c-u}} \quad \text{(Correlation of the test treated uniquely with the } c-u \text{ composite score)}$$

TABLE VIII

First Approximation

Variables	Wts.	0	1	2	3	4	5	6	7	$(Wts.)^2$
		$w_p r_{0p}$	$w_1 w_p r_{1p}$	$w_2 w_p r_{2p}$	$w_3 w_p r_{3p}$	$w_4 w_p r_{4p}$	$w_5 w_p r_{5p}$	$w_6 w_p r_{6p}$	$w_7 w_p r_{7p}$	
1	10	3375	----	----	----	----	----	----	----	1000
2	10	3708	5455 100 545	----	----	----	----	----	----	1000
3	10	3407	4960 100 496	4766 100 477	----	----	----	----	----	1000
4	20	9460	3478 200 696	2886 200 577	2983 200 597	----	----	----	----	4000
5	30	18636	5004 300 1501	5038 300 1511	4363 300 1309	4587 600 2752	----	----	----	9000
6	10	3425	4370 100 437	2849 100 285	3284 100 328	2652 200 530	3369 300 1011	----	----	1000
7	20	9694	4278 200 856	3822 200 764	4315 200 863	4082 400 1633	5176 600 3106	4300 200 860	----	4000
	s	51705	4531	4159	4070	6787	11190	4451	8082	$21000 = S_{w^2}$
			S_1	S_2	S_3	S_4	S_5	S_6	S_7	$43270 = S$
										$64270 = s'^2_s$
										$8016 = \sigma_s$
										$6450 = r_{s_0}$

TABLE IX

Second Approximation

Variables	Wts.	0	1	2	3	4	5	6	7	(Wts.)²
		$w_p r_{0p}$	$w_1 w_p r_{1p}$	$w_2 w_p r_{2p}$	$w_3 w_p r_{3p}$	$w_4 w_p r_{4p}$	$w_5 w_p r_{5p}$	$w_6 w_p r_{6p}$	$w_7 w_p r_{7p}$	
1	−02	−674	----	----	----	----	----	----	----	40
2	+05	1850	5455 −10 −55	----	----	----	----	----	----	250
3	−01	−340	4960 +2 +10	4766 −5 −24	----	----	----	----	----	10
4	+20	9460	3478 −40 −139	2886 +100 +289	2983 −20 −60	----	----	----	----	4000
5	+41	25469	5004 −82 −400	5038 +205 +1008	4363 −41 −179	4587 +820 +3761	----	----	----	16810
6	+06	2055	4370 −12 −49	2849 +30 +85	3284 −6 −18	2652 +120 +318	3369 +246 +829	----	----	360
7	+16	7755	4278 −32 −137	3822 +80 +306	4315 −16 −69	4082 +320 +1306	5176 + 656 +3395	4300 +96 +413	----	4000
	S =	45575	−770	+1609	−340	+5475	+8414	+1578	+5214	25470 = Sw^2
										21180 = S
										46650 = σ^2_e
										6830 = σ^2_e
										$\frac{4557}{6830} = \frac{s}{\sigma_e}$
										66+ = r_{0e}

TABLE X

Third Approximation

Variables	Wts.	0	1	2	3	4	5	6	7	(Wts.)²
		$w_p r_{0p}$	$w_1 w_p r_{1p}$	$w_2 w_p r_{2p}$	$w_3 w_p r_{3p}$	$w_4 w_p r_{4p}$	$w_5 w_p r_{5p}$	$w_6 w_p r_{6p}$	$w_7 w_p r_{1p}$	
1	−01	−337	----	----	----	----	----	----	----	10
2	+05	1850	5455 −5 −27	----	----	----	----	----	----	250
3	−01	−340	4960 +1 +5	4766 −5 −24	----	----	----	----	----	10
4	+20	9460	3478 −20 −69	2886 +100 +289	2983 −20 −60	----	----	----	----	4000
5	+40	24848	5004 −40 −200	5038 +200 +1006	4363 −40 −174	4587 +800 +3669	----	----	----	16000
6	+06	2055	4370 −6 −26	2849 +30 +85	3284 −6 −18	2652 +120 +318	3369 +240 +809	----	----	360
7	+16	7755	4278 −16 −68	3822 +80 +306	4315 −16 −69	4082 +320 +1306	5176 +640 +3312	4300 +96 +413	----	2560
	$s =$	45291	−385	1638	−340	5453	8422	1581	5200	23190 = Sw^2 1566 = S
			S_1	S_2	S_3	S_4	S_5	S_6	S_7	44756 = σ^2_c
	$\sigma^2_{c-u} =$		4397	41290	45426	29850	19912	41234	31796	66899 = σ_c
	$\sigma_{c-u} =$		67465	6425	67398	54635	44622	64213	56387	$\frac{45291}{66899} = \frac{s}{\sigma_c}$
	$r_{0(c-u)} =$		67632	6761	67703	6558	65642	67332	66568	6770 = r_{0c}
	$r_{u(c-u)} =$		571	5091	5044	4990	47187	41036	57636	
	$w_{uuu} = -$		.00723	.0494	−.0067	.1954	.4030	.0796	.1512	

TABLE XI

Fourth Approximation

Variables	Wts.	0	1	2	3	4	5	6	7	(Wts.)²
		$w_p r_{0p}$	$w_1 w_p r_{1p}$	$w_2 w_p r_{2p}$	$w_3 w_p r_{3p}$	$w_4 w_p r_{4p}$	$w_5 w_p r_{5p}$	$w_6 w_p r_{6p}$	$w_7 w_p r_{7p}$	
1	−01	−337	----	----	----	----	----	----	----	10
2	+05	1850	5455 −5 −27	----	----	----	----	----	----	250
3	−01	−340	4960 +1 +5	4766 −5 −24	----	----	----	----	----	10
4	+20	9460	3478 −20 −69	2886 +100 +289	2983 −20 −60	----	----	----	----	4000
5	+40	24848	5004 −40 −200	5038 +200 +1006	4363 −40 −174	4587 +800 +3669	----	----	----	16000
6	+08	2740	4370 −8 −34	2849 +40 +114	3284 −8 −26	2652 +160 +424	3369 +320 +1088	----	----	640
7	+15	7270	4278 −15 −64	3822 +75 +287	4315 −15 −65	4082 +300 +1225	5176 +600 +3108	4300 +120 +516	----	2250
	$s =$	45491	−389	1645	−344	5478	8497	2082	5007	23160 = Su^2 21976 = S
			S_1	S_2	S_3	S_4	S_5	S_6	S_7	45136 = σ^2_u
	σ^2_{c-u} =	44348	41596	45814	30180	12142	40332	32872		67183 = σ_c
	σ_{c-u} =	6775	64494	67686	54936	34845	63507	57334		$\frac{45491}{67183} = \frac{S}{\sigma_c}$
	$r_0(c-u)$ =	6764	67666	67711	6558	5925	6731	6666		.6771 = r_{0c}
	$r_u(c-u)$ =	574	51007	5080	4985	6097	4097	5822		
	w_{uuuu} =	−.0075	.04812	−.0043	.1944	.4138	.0801	.1461		

"It will be noted that if we have a problem involving one dependent variable and n independent variables, there are n terms in s, $n\ (n-1)$ terms in S, $(n-1)$ terms in S_u. We now have all the requisite formulas and may proceed with the calculation..... In the accompanying table p stands for the variable designated in the stub."

The first weights give a multiple correlation of .6450 and lead to the determination of the second approximation weights. The second weights are given by a quick inspection method.[8] The second weights give a multiple correlation of .66 + leading to the determination of the third approximation weights. The third weights give a multiple correlation of .6770, which again leads to the determination of the fourth approximation weights. The fourth weights were taken as final since the multiple correlation resulting is .6771. In view of the slight increase in multiple correlation by carrying the calculations from the fourth to the fifth approximations, it was deemed inadvisable to carry the computation another step.

The results of the above calculations are shown in Table XII and place the seven variables in the following order of importance:[9]

TABLE XII

RESULTS OF CALCULATIONS

Variables	Weights First Guess	Weights Second Approximation	Weights Third Approximation	Weights Fourth Approximation	Weights Fifth Approximation
1	10	−02	−01	−.0072	−.0075
2	10	05	05	.0494	.0481
3	10	−01	−01	−.0067	−.0043
4	20	20	20	.1954	.1944
5	30	41	40	.4030	.4138
6	10	06	06	.0796	.0801
7	20	16	16	.1512	.1461
Multiple Correlation Resulting	.6450	.66+	.6770	.6771	----

[8] The writer is indebted to Dr. F. S. Salisbury for the following suggestion which is contained in an unpublished article. In brief, if the $w_{prop} = W^2 + S$, the weighting for that variable is accurate. By a process of trial, weights may be tried, the summations (S) computed and the above formula applied. This method is accurate enough for the first approximations and reduces the time necessary in calculations to a fraction of the time it would take to complete each computation.

[9] The revision of the test will be in accordance with these data.

1. Ability to write tonal patterns from dictation.
2. Ability to identify well-known melodies when read silently.
3. Ability to write melodies from dictation.
4. Ability to write rhythmic patterns from dictation.
5. Recognition of scales, chords and intervals.
6. Knowledge of measure and note values.
7. Knowledge of music symbols, marks of expression, etc.

BI-SERIAL CORRELATION

To show the effect of private training in music on achievement in school music, the bi-serial method was used. It occurred to the writer that private musical training must have some effect on school music achievement. The fact that some have had and some have not had private lessons brings out an implication of dichotomy,—a categorical series.

In the class represented by those having privately studied music, one finds children who have studied two months, four months, one year, two years, etc. It was thought, however, that private study of three months or less would have little effect on the group-test score, so the dichotomy was arbitrarily imposed at that point. Thus, one series, the group-test, consists of variates, and the other, the categorical series, is dichotomous, assuming that the second is a continuous trait and the distribution normal.

Kelley[10] gives the method of calculation:

$$r = \frac{M_2 - M_1}{q} \times \frac{pq}{z}$$

"Let p be the proportion of cases in the first y-category, and q the proportion in the second. The distance y is simply the mean deviate of the tail of a normal distribution, . . . If z is the K-W, at the point of truncation of the normal distribution, ordinate . . . cutting off p proportion of cases, we have

$$\frac{y_1}{\sigma_1} = \frac{z}{p} \text{ and } \frac{y_2}{\sigma_2} = \frac{z}{q} \text{ so that } r = \frac{\frac{M_2 - M_1}{\sigma}}{\frac{z}{p} + \frac{z}{q}}$$

which may be written:

$$r = \frac{(M_2 - M_1)\,pq}{\sigma z} \text{ (Bi-serial coefficient of correlation)."}$$

[10] Kelley, T. L., *Statistical Method*, p. 248, Macmillan Co.

Therefore,

$$r = \frac{73.9570 - 42.9495}{28.721} \times \frac{.204631}{.340631}$$

$$r = .655$$

TABLE XIII

BI-SERIAL CORRELATION

Score on Group-Test	Number of Pupils with Private Musical Training	
	Three Months or Less	Four Months or More
150–154	--	2
145–149	--	--
140–144	--	1
135–139	--	--
130–134	--	4
125–129	--	6
120–124	--	5
115–119	--	4
110–114	2	7
105–109	--	10
100–104	3	2
95– 99	3	8
90– 94	6	12
85– 89	5	9
80– 84	8	11
75– 79	8	14
70– 74	20	16
65– 69	17	11
60– 64	29	18
55– 59	29	13
50– 54	27	8
45– 49	38	14
40– 44	52	5
35– 39	54	8
30– 34	45	5
25– 29	37	6
20– 24	45	4
15– 19	35	2
10– 14	26	2
5– 9	11	--
0– 4	16	--
N	516	207
		516
Total		723

The standard error:[11]

$$\sigma_r = \frac{\sqrt{\frac{pq}{z} - r^2}}{\sqrt{N}}$$

$$\sigma_r = \frac{\frac{.4523}{.3406} - (.655)^2}{26.88}$$

$$\sigma_r = .0339$$
$$P.E._r = .02287$$

GROUP-TEST AND MENTAL AGE

The Bureau of Research in the Washington, D. C., schools supplied intelligence ratings of the children tested in that city. In most cases, each child had been given two group intelligence tests.

Since the IQ's were available, together with the chronological ages, the two IQ's were averaged and multiplied by the chronological age in order to get the mental ages. There were 406 complete intelligence records, and these were used for correlation purposes with the Mosher group-test, the calculation resulting in a correlation coefficient of .6009.

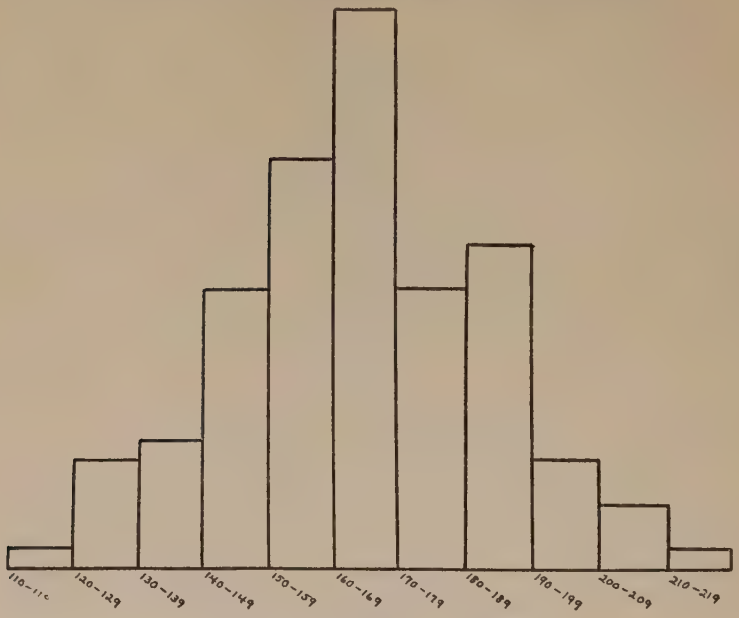
In the group of 128, part of whom were Washington and part San Jose children, the writer found 107 intelligence records. The following table shows the raw correlation resulting between the separate tests of the group-test and mental age.

TABLE XIV

RAW CORRELATION—MENTAL AGE AND SEPARATE TESTS

	r
Test 1	.3963
Test 2	.2755
Test 3	.2753
Test 4	.2384
Test 5	.3533
Test 6	.2126
Test 7	.3398

[11] Kelley, *Op. cit.*, p. 249.



Mean Mental Age . . 164.253
Standard Deviation . . 19.223

FIG. I. Histogram Showing the Distribution of Mental Ages for the Criterion Group (107 Cases)

SIGHT-SINGING AND MENTAL AGE

The relationship existing between non-intellectual traits and mental age has occupied the thought of educational psychologists for some time. In music, Seashore has shown[12] a low correlation between tests of musical capacity and intelligence. It is believed that there is probably little relationship between music achievement and achievement in other school subjects.[13] This statement is, in the main, a subjective estimate, or it is based on comparatively few outstanding cases where the lack of correlation is easily recognized.

In this study scores obtained on the individual sight-singing test were correlated with mental age measures, where the latter were available. In all, 107 cases gave a correlation of .1532.

This coefficient of correlation seems significant since a measure

[12] Seashore, C. E., *Psychology of Musical Talent*, Silver, Burdett Co.
[13] Hollingworth, L. S., *Special Talents and Defects*, p. 169, Macmillan Co.

of sight-singing achievement was objectively obtained. Since the coefficient approaches zero, it is reasonable to suppose that children of superior intelligence need not be expected to stand in the upper levels of achievement in singing. For the same reason, those who show superior ability in singing may be quite below the average in intelligence.

MUSICAL CAPACITY AND GROUP-TEST SCORES

Table XV shows the correlation existing between the Seashore measures of musical capacity and achievement as measured by the Mosher group-test.

Intensity correlates highest with the group-test. The explanation of this fact may be due to the great emphasis placed on hearing and noting stress or accent. Therefore, its likeness to classroom activities might account for the high relationship with the Mosher group-test.

Consonance correlates lowest with the group-test. This is probably due to the fact that the children find it difficult to divorce their feeling of musical value from the definition of smoothness, blend and fusion.

TABLE XV

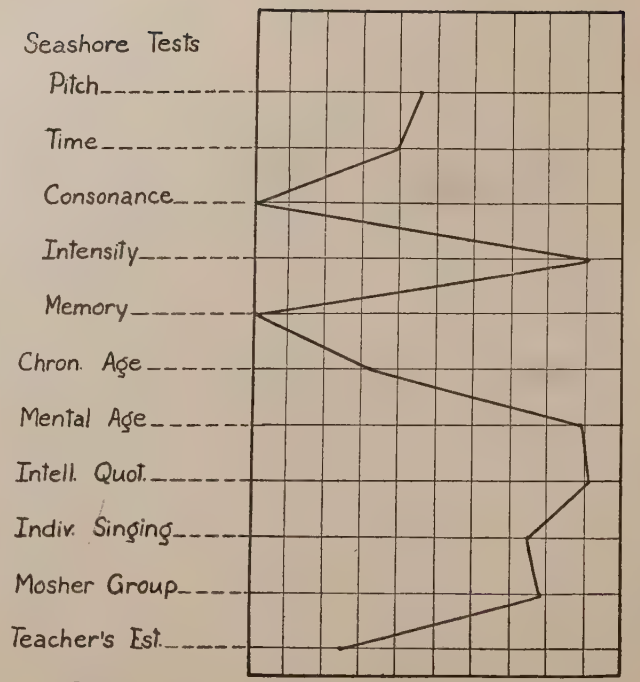
CORRELATION OF MOSHER GROUP-TEST WITH SEASHORE TESTS

	Time	Consonance	Pitch	Memory	Intensity
r	.3581	.2912	.4391	.4386	.4858
N	459	434	460	430	460

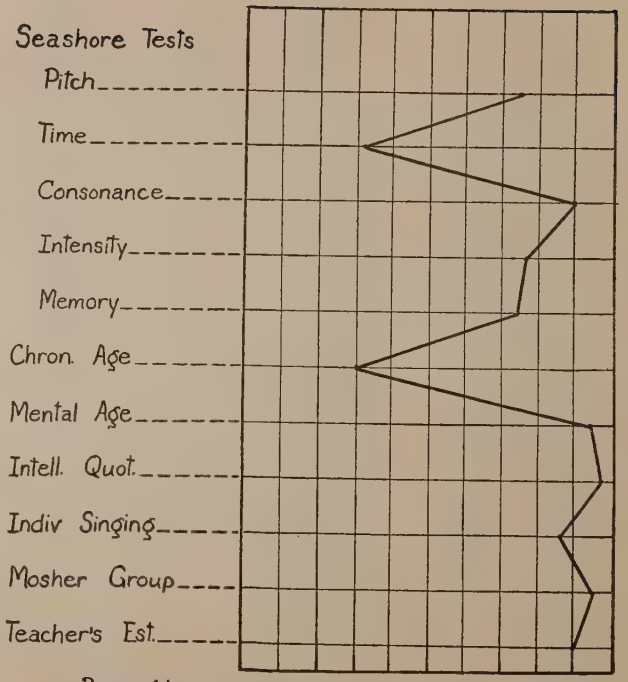
The following case studies represent types of extreme divergence in scores in Seashore Tests from the Mosher Group-and Individual-Tests (oral).

STUDY OF ERRORS, MEASURE BY MEASURE, TO ASCERTAIN DIFFICULTY OF SIGHT-READING ELEMENTS

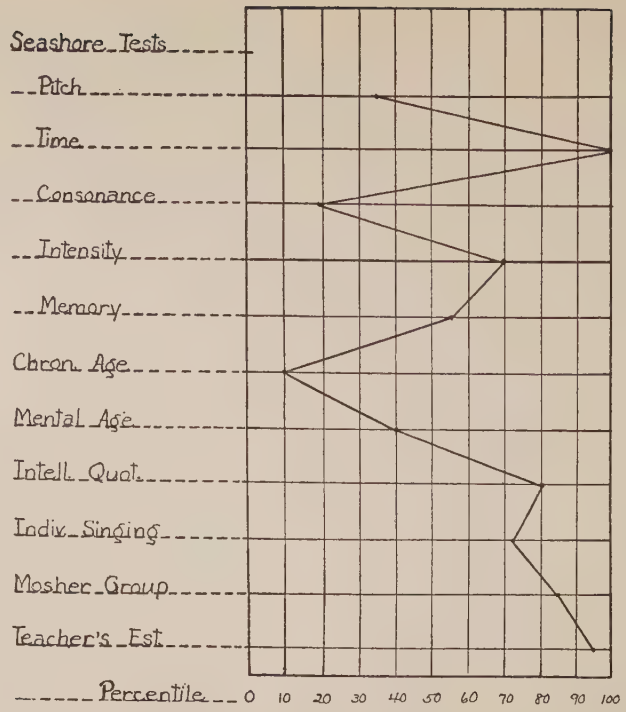
Since the addition of music to the curriculum of the elementary school, the emphasis has been on the formal drill aspects of the subject. As in arithmetic, where the pupil is drilled day after day on number combinations, so it has been in music; the formal isolated technical problems have received the most attention. No



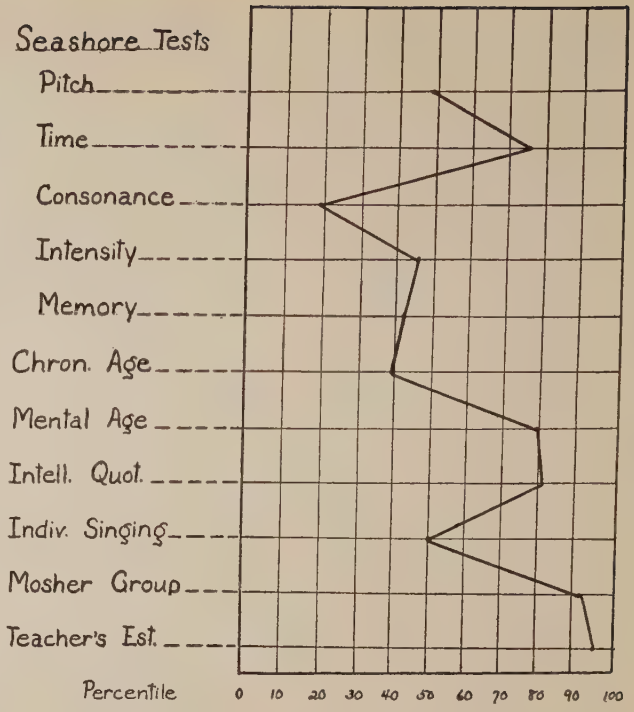
PSYCHOGRAPH OF H. R. BOY. 7TH GRADE



PSYCHOGRAPH OF H. W. BOY. 8TH GRADE



PSYCHOGRAPH OF P. W. GIRL. 6TH GRADE



PSYCHOGRAPH OF C. G. GIRL. 8TH GRADE

extensive study has yet been made, as has been done recently in arithmetic,[14] to determine the order of difficulty of certain rhythmic and tonal patterns. Quite to the contrary, the teacher of music has had no notion of whether the tonic chord or scale progression is inherently more difficult as a means of introducing sight-reading. Because of this lack of scientific investigation in public school music, the traditional sight-singing program has not succeeded in attaining those goals to which it has striven. It is undoubtedly true that many reactions in music have been over-learned while other reactions pertinent to increasing singing skill have been under-learned.

Application of Educational Research

The teaching of spelling and arithmetic has profited greatly by studies made in determining levels of difficulty, conditions which affect the optimum method of learning, and the proper selection of subject materials for the elementary school. The application of the simplest instruments of statistical research to the field of sight-singing in the schools would probably result in similar benefit. To the writer's knowledge, no one has ever determined the degree of difficulty of a tonic chord progression entirely in one measure, as in Figure II.

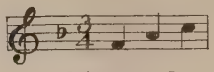


Fig. II.

in relation to the level of difficulty of the tonic chord divided into two measures, as in Figure III.

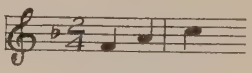


Fig. III.

Until this problem and many others are subjected to careful investigation, no one will be able to say conclusively (1) which of the two figures is the easier, (2) which will need the more drill for complete retention, (3) what drill will be necessary to keep it above the limen of recall, (4) the number of eye fixations per line, and (5) the number of eye regressions, etc.

[14] Thorndike, E. L., *Psychology of Arithmetic*, Macmillan Co.

Need for Psychological Analysis

In the simple problem stated above, one might analyze the bonds necessary for an adequate utterance of each of the two contrasted exercises. It is obvious that the staff is identical in both; that there is a clef and one flat in the signature in each; and that there is a 3/4 measure sign in the first, and a 2/4 measure sign in the second. Having observed the key sign, one should next turn to determining *do*, or "one of the scale."

It may be that Figure II is easier because the 1-3-5, or *do-mi-so*, is in one measure, whereas in Figure III the separation of the tonal series into two measures accounts for the added difficulty in singing it. Thus, when a tonic chord succession is entirely within one measure, it is an "eye full," but when it is divided by the introduction of a bar, it goes over into another difficulty level.

It is barely possible that music supervisors have noted a difference in pupils' ability to sing patterns similar to those indicated above. It is also possible that they have accounted for the inability to render one or the other in somewhat the same manner as here suggested. However, that is merely a beginning. What is needed is a still more careful study of the problem so as to assign an accurate difficulty level to each and every problem. By a simple tabulation method, this and many other of the tonal and rhythmic problems may be assigned their relative positions on a basis of difficulty, thereby helping to solve the matter of grading music material for elementary children.

Analysis of Relative Singing Difficulties of Problems Involved in the Various Items of the Individual-Test (Sight-Singing Criterion)

In Test-item 1 the key is F Major, which allows the exercise to be written within the limits of the staff.

In Test-item 2, key and tonal pattern remain constant while measure changes. In this way, the experimenter can ascertain in a rough way, within the limits of this experimental procedure, whether or not variations in measure influence the ability to read an exercise involving about equal content. The quarter note, half note, and dotted half are involved.

In Test-item 3, the key is changed, the measure is equal to Test-item 1. The tonal pattern is repeated scale tones in descending

order. This exercise involves two periods of rest, with the appropriate sign.

In Test-item 4, the key is changed to four sharps; however *do* is located on the same staff degree as in Test-item 3. The measure becomes four-quarter and the notes involved are quarter throughout. Tonally, the exercise is "scale descending and ascending," with one tone repeated, namely 5.

In Test-item 5, the key is the same as in Test-item 3. The measure sign is not new. The new elements involve: (1) Beginning on the unaccented beat, (2) downward skip 5-1, and (3) establishing tone 5, from hearing 1.

In Test-item 6, the key is C. The exercise begins on 5 of the scale, and ascends to 8. A scale-wise progression follows with a point of repose on 3. Following this the exercise introduces a descending interval 2-6, and 6-2, followed by 8-5. The interval 6-8 is introduced in the precadence measure. The belief is popular that reading in the key of C Major is the easiest of all keys. This belief is scarcely substantiated by the findings of this experiment. On the contrary, the actual scale progressions are missed more frequently in the key of C than are some of the other tonal patterns in other keys. It will be of value in some future special study to determine relative difficulty of various keys by holding absolutely constant all other factors.

Test-item 7 is written in the key of G Major, and the chief problem for the pupil is the rendition of an exercise involving periods of rest at points other than the natural and expected places. In tonal content there are no new problems.

Results. An Indication of the Relative Difficulties in Sight-Singing

Table XVI shows a tabulation of the percentages of successes on each measure in Items 1 to 7 of the Individual-Test.

In one column, the "tonal" percentages are shown and in the other, the "rhythmic" percentages. According to these data, the order of difficulty in tone patterns from easy to more complex is as follows:

1. Descending scale progressions, Test IV. Measure X-1.
2. Repeated descending scale progressions, Test V. Measures X-4 inclusive.
3. Tonic chord, Tests I and II.

4. Repeated tones in ascending scale progression, Test V. Measures X-4 inclusive.
5. The scale progressions in key of C *seem* to be more difficult than in any other key given.
6. Intervals (skips) larger than primes, seconds, seem to range in difficulty as follows:
   a. 8-5 except when preceded by 2′-6.
   b. 5-3.

Quite contrary to general belief, mistakes in rhythm are comparatively fewer in number than mistakes in tone. The tables show a consistently higher percentage of passes in rhythm than in tone. It is interesting to note that the exercises which stand highest in percentage of passes in tone stand highest in percentage of passes in rhythm. It would seem that rhythm and tonal content are mutually facilitating; that one is dependent upon the other.

The next step, to be undertaken sometime in the future, is to render key constant and ascertain the difficulty level of each element in the exercise. A new scoring method could be evolved which would involve the interval as a unit. With this in mind, more explicit information could be obtained concerning the relative difficulty of intervals.

TABLE XVI

PERCENTAGE OF SUCCESSES ON SEPARATE MEASURES OF THE INDIVIDUAL-TEST

TEST	TONE									RHYTHM								
	Measure									Measure								
	x	1	2	3	4	5	6	7	8	*x*	1	2	3	4	5	6	7	8
I	--	33.3	34.6	24.3	37.1	--	--	--	--	--	41.0	41.0	43.5	35.8	--	--	--	--
II	--	33.3	33.3	23.0	35.8	--	--	--	--	--	50.0	44.8	53.8	25.7	--	--	--	--
III	--	58.9	50.0	47.4	48.7	39.7	29.4	33.3	34.6	--	68.1	58.9	53.8	51.2	51.2	47.4	48.7	43.5
IV	66.6	60.2	52.5	47.4	47.4	--	--	--	--	65.3	53.8	47.4	55.1	50.0	--	--	--	--
V	39.7	30.7	29.4	32.0	33.3	37.1	35.8	35.8	41.0	46.1	52.5	55.1	50.0	46.1	51.2	52.5	48.7	50.0
VI	32.0	25.7	24.3	21.7	17.9	38.0	64.0	64.0	10.0	47.4	33.3	26.9	29.4	12.0	11.0	14.1	14.1	11.5
VII	21.7	19.2	17.9	19.2	21.7	--	--	--	--	33.3	21.7	19.2	26.9	25.6	--	--	--	--

CHAPTER V

INTERPRETATIONS AND CONCLUSIONS

THE SINGLE TESTS IN ORDER OF RANK

Preceding chapters have presented the method of procedure in analyzing the effectiveness of group methods in measuring achievement in sight-singing. It is the purpose here to interpret the results of the study to bring out whatever implications there may be for those interested (1) in test construction and (2) in the supervision and teaching of public school music.

The basic consideration in measuring any trait is the determination of a criterion. To meet this demand, actual sight-singing was set up as the criterion. An instrument was devised which would give an index to sight-singing achievement in quantitative terms. This instrument showed a constancy coefficient of .9. Assuming this tool to be an adequate means for measuring sight-singing achievement, we proceed to the next consideration.

The purpose of the study is to ascertain what combination of single group-tests gives the best measure of sight-singing achievement. We must therefore consider the statistical material. Coefficients of zero order mean very little in themselves. It is difficult to determine just how to interpret a raw correlation of .4730.

The method of analyzing variables in the realm of complex concomitance is by the use of the coefficient of multiple correlation. By this treatment of raw correlations, one can tell the relationship of a group of independent variables with a criterion.

Having evaluated the entire group of correlation factors in terms of a criterion, by the multiple correlation method, the regression equation is used to assign the proper weights to the separate factors.

From the data of this study, the tests in the order of their maximal power to measure sight-reading achievement by group methods are:

Test V. Dictation of tonal patterns and figures.

Test IV, Silent reading of melodies.
Test VII, Dictation of melodies.
Test VI, Dictation of rhythmic patterns and figures.
Test II, Recognition of scales and chords.
Test III, Knowledge of measure and note values.
Test I, Knowledge of musical symbols and terms.

The conclusions in regard to the seven single tests which have been considered as factors in the sight-singing process need not be considered a final statement of relative values. The scores upon which the ranking is based are relatively few and rather crudely estimated. However, the method of procedure in evaluating the parts of the battery is valid and statistically sound. The application, therefore, of the same treatment to new data will eventually result in the ultimate determination of better groupings.

If for the present the relative weights found in the seven activities are taken at their face value, the data present interesting implications for music teachers. First, ability to write melodic themes is a fair index of singing achievement. Second, ability to read through a melody silently shows some relationship with success in actual singing. Third, isolated information about music and isolated knowledge of measures and time symbols have less effect on ability to read music.

These data indicate within certain limits the single tests which show a substantial correlation with ability in the assumed criterion. To understand the similarity between the functions measured in the group-test and those involved in the criterion, the reliability coefficients of each test as a whole are necessary. Since the correlation of the group-test with the criterion (.68) is less than the "correlation between a single test and the true score," ($\sqrt{.95}$) multiplied by the maximum reliability value of the criterion ($\sqrt{.95} \times .931 = .9021$), there is "proof that some of the traits which are truly measured by the test are not elements of capacity involved in the criterion."[1]

THE BEST SINGLE TEST

The single test that is the best measure of sight-singing achievement is Test V—dictation of tonal patterns. It is probably safe to say that reading music is dependent upon the power to think

[1] Kelley, T. L., "The Reliability of Test Scores." *Jour. of Ed. Res.*, Vol. 3, pp. 371–73.

music. If this be true, ability to write from dictation the several tonal patterns is undoubtedly a measure of one's power to *think* in the tonal language in terms of relationships of pitch.

SIGNIFICANT CHARACTERISTICS OF SINGLE TESTS

The characteristics of the single tests which make for a high correlation with the criterion are:

1. *Test V.* For success in it, the pupil is dependent upon experience in tonal language. The thinking of the tonic chord in terms of 1, 3, 5 or do, mi, so, and the representation of it on the staff is a frequent experience in school music.

Pupils develop a familiarity with the tonic chord because of its constant recurrence in music-literature. This is true of scale patterns in the major mode but less true of the minor mode.

Since the correlations between Test V and mental age is .3533, one is led to think that the influence of intelligence is low. On the other hand, this test has a higher correlation with mental age than any other single test except Test I.

2. *Test IV* ranks second in its power to measure sight-singing achievement. This test reduces the influence of intelligence to a negligible amount. It is the most direct effort to measure sight-singing in the entire battery, but has certain limitations, namely:

a. It demands a type of sight-reading which is somewhat different from the requirements of the schoolroom in that silent reading of music is rarely if ever done. For this reason, it is not typical of present classroom procedure.

b. The inherent good qualities of the test are outweighed by the newness of the testing situation. In general children probably would not be able to *think through* each item of the test without humming.

c. It sifts out the musical child but does not differentiate lower levels of achievement. Many children get a zero score on the test, either because of lack of musical ability or of inability to follow directions.

THE CRITERION

It has been shown that the formulation of a criterion in sight-singing is entirely possible.[2] The individual singing test was given

[2] See Chap. IV, p. 32.

twice to a group of seventy-eight children. Two methods of scoring were employed. The self-correlations with first one method, then the other, were computed, the results being as follows: Method I—r = .913; Method II—r = .931.

These coefficients show a constancy value which leads one to believe that it is not only possible but fairly safe to postulate a criterion in sight-singing. In brief:

1. Statistical treatment shows a high "constancy" coefficient[3] (self-correlation) in the repetition of the test.
2. It differentiates degrees of attainment.
3. The test can be administered and scored by teachers of school music with a high degree of accuracy.

MUSICAL CAPACITY AND SIGHT-SINGING ACHIEVEMENT

The raw correlations between Seashore Tests of musical capacity and the Mosher Group-Test show coefficients which are markedly low. As they approach zero, the implication is that there will be some pupils with a high score of Seashore Tests who will show a low score on the Mosher Group-Test.

If we assume the Mosher Group-Test to be a fairly accurate measure of sight-singing achievement, with the influence of intelligence reduced to a minimum (See Table XV), the correlations with the Seashore scores are significant. In the first place, assuming the Seashore Tests to measure native capacity, the data show that measures of native capacity do not predicate success in singing; second, that the recognition of the limits of capacity for individuals might aid in defining the possible ultimate achievement in sight-singing; third, that if the Seashore test scores are considered accurate estimates of musical capacity, a number of pupils fall far short of what they are innately capable of doing. Likewise, one might say that those of a mediocre talent are achieving more in terms of their endowment than are those of superior ability. A similar situation undoubtedly exists in many other subjects. Often the duller pupils exert themselves much more than do the superior, the former obtaining higher marks than one would expect in view of their native capacity.

[3] It should not be assumed that the repetition of a test to secure a reliability coefficient is advised. On the contrary, the self-correlations secure an upper limit which the true reliability coefficient will not exceed. (Kelley, T. L., *Statistical Method*, p. 203, Macmillan Co.)

THE RÔLE OF INTELLIGENCE

From the data of this study, it appears that intelligence plays some part in achievement in sight-singing. It is therefore unsafe to say that sight-singing is strictly a non-intellectual trait. It has been shown in preceding paragraphs that Test V ranks first in its power to measure sight-singing achievement. Its weighting is twice that of the second in order of rank. The question arises: To what extent is success in Test V dependent upon intelligence; that is, ability to comprehend directions, to take a problem and see it through, to evaluate the product critically when opportunity for checking is given. It is safe to say that in view of the coefficient of correlation, a pupil with a high intelligence score will not necessarily excel in Test V. Success in Test V involves a minimum of intelligence, enough to follow the directions and sustain effort, and a maximum of training in classroom activities, which may be sight-singing or frequent practice in dictation.

The rôle played by intelligence in Test IV seems to be almost negligible, the coefficient of correlation being .2384. The reason for this is perhaps the *objectivity* of the test, making definite demands on the product of musical training, rather than on years lived or mentality. A further explanation is that the test is *direct.* It resembles closely that which teachers are eager to obtain, namely, real reading ability. Therefore the data seem to point to the fact that no amount of intelligence independent of training could bring success in this test.

Test I shows the highest correlation with intelligence. Since many of the items of this test are of a general nature, they might be classed as information which any well read individual would be likely to possess.

Test VI correlates .2126 with intelligence. In this case, it appears that success is dependent upon training. No amount of intelligence apart from training can assure a high score.

Test VII correlates .3398 with intelligence. Melodic dictation involves a high degree of musicianship to thoroughly master it as well as a modicum of intelligence. This test ranks third from the highest in its correlational value.

The influence of intelligence on success in Test II and Test III is about equal. Respectively, the correlations are .2755 and .2753. These coefficients are no more than would be expected in any achievement test.

With the limited data of this study, where the separate tests of the battery are correlated with intelligence, it seems to be true that achievement in sight-singing tends to be unitary, depending only to a limited degree upon intelligence. Ruch, in his study of junior high school pupils at the University of Oregon, found low correlations between intelligence and Courtis addition (.32) and Ayres spelling ($r = .22$); whereas, fairly high correlations were found in Stone reasoning ($r = .65$) and Gregory language ($r = .62$). In spelling and sums, intelligence influences achievement but little. The other subjects, arithmetic, reasoning and language are better indices of innate capacity.

THE EFFECT OF PRIVATE TRAINING ON SIGHT-SINGING ACHIEVEMENT

The data of this study show a substantial relationship between private training in music and achievement in sight-singing as measured by the group-test. It seems reasonable to infer that such training prepares the pupil to more ably meet the requirements of the group-test. If this relationship is a causal one, it might be explained by the fact that private training not infrequently stresses theoretical phases as well as performance. Such emphasis would fit the pupil to meet more easily the various elements in the group-test.

If, on the other hand, talented children are recognized as such by their parents and given private training, the above explanation would not hold.

EFFECTIVENESS OF THE GROUP-TEST

Since there was but one form of the group-test, the only method available for ascertaining its reliability is correlating the odds with the evens. When the Spearman-Brown formula was applied, the coefficient of reliability resulting was .95+.

The meaning and implication of this correlation is somewhat doubtful. The first thought is that whatever the instrument tests, it tests it fairly well.

It should be remembered that public school music is concerned chiefly with the teaching of singing.[4] Therefore, no scale, either group or individual, performs a real service unless it measures

[4] Hollingworth, L. S.. *Special Talents and Defects*, p. 180.

the singing achievement made by the children at the various age or grade levels.

There is a danger in the use of music achievement tests, in that the authors have not always made it clear for just what aspect of the general field they have sought to devise a test. "Public school music" or "school music" is a loose caption to apply to tests. If general information about music, ability to indicate pitch and syllable names, and recognition of melodic errors are considered essential features of public school music in its widest sense, a legitimate attack has been made in constructing the tests. If, on the other hand, attempts to measure these separate features are expected to yield an index of singing achievement, the amount and the relative contribution of each separate feature should be plainly stated.

The coefficients of reliability of the Mosher group-test demonstrate the impasse into which investigators may be thrown. They are sufficiently high to lead the unthinking far astray.

In view of the coefficients of reliability, the originator of the test is left in a dilemma. The problem, to repeat a statement made in one of the first paragraphs, is to ascertain to what extent group methods may be employed to measure (indirectly) sight-singing achievement.

When one hundred and twenty-eight unselected cases were given the individual singing test, the resulting raw correlation of the group-test and the singing test was .65. Assuming the latter instrument to be the criterion for achievement one concludes that the effectiveness of the group-test is limited.

VALIDITY OF THE GROUP-TEST

An examination of the multiple correlation coefficient, together with the regression coefficients, is an even better index to the validity of the group-test than raw correlation with a criterion. It is at this point that the reader may judge how well the group-test measures what it purports to measure. This multiple correlation (R) is .68.

It is obvious that the error in judging sight-singing will be fairly wide should a teacher estimate an individual pupil's achievement in terms of a group-test score alone. Nevertheless, it seems safe to say that however rough and crude such an estimate may be, it is likely to be more accurate than the subjective judgment of classroom teachers.

APPENDIX

I

SCORES ON INDIVIDUAL-TESTS, MOSHER GROUP-TESTS, SEPARATE TESTS AND MENTAL AGE

(128 Cases)

Pupil	Individual Singing	Mosher Group (Composite)	Separate Tests							Mental Age
			1	2	3	4	5	6	7	
1	29	34	19	0	2	0	13	0	0	123
2	19	38	21	1	3	0	3	6	4	149
3	109	52	18	1	3	2	24	4	0	--
4	108	49	12	2	4	0	27	4	0	--
5	126	102	31	4	6	4	47	6	4	160
6	8	11	9	1	1	0	0	0	0	153
7	135	97	26	3	4	2	54	0	8	--
8	108	78	19	2	7	0	43	3	4	153
9	14	57	11	0	2	2	23	9	0	140
10	67	23	6	1	4	4	7	1	0	--
11	0	47	19	2	2	0	22	2	0	125
12	0	31	17	0	1	0	13	0	0	137
13	3	82	34	2	6	0	34	2	4	136
14	13	48	11	2	4	4	25	2	0	140
15	9	100	40	2	5	2	38	9	4	127
16	94	53	22	0	1	2	26	2	0	146
17	6	2	0	0	1	0	1	0	0	--
18	11	28	12	0	2	0	13	1	0	140
19	20	51	24	0	5	2	10	10	0	137
20	62	56	15	3	5	4	29	0	0	147
21	17	22	15	0	4	0	1	2	0	139
22	25	60	18	1	3	2	33	3	0	156
23	119	106	44	4	5	4	38	9	2	160
24	120	125	44	4	7	4	50	8	8	150
25	3	43	23	0	4	0	16	0	0	167
26	128	121	46	8	6	2	46	5	8	163
27	73	72	38	1	4	2	18	5	4	159
28	96	67	25	3	7	6	8	12	6	156
29	139	97	26	3	3	2	52	7	4	--
30	0	47	25	1	2	0	17	2	0	--
31	139	135	46	3	5	6	56	13	6	--
32	31	49	11	0	5	0	26	3	4	--
33	114	95	23	4	1	2	52	7	6	--
34	56	98	40	1	5	6	32	10	4	167
35	51	89	34	3	5	2	36	9	0	185
36	4	25	19	0	0	0	6	0	0	145
37	2	43	23	0	0	0	15	5	0	157
38	0	37	23	1	2	0	11	0	0	165
39	91	91	40	2	2	2	37	7	0	167

SCORES ON INDIVIDUAL-TESTS, MOSHER GROUP-TESTS, SEPARATE TESTS AND MENTAL AGE

[Continued]

Pupil	Individual Singing	Mosher Group (Composite)	Separate Tests							Mental Age
			1	2	3	4	5	6	7	
40	89	77	19	2	2	2	39	9	4	159
41	84	88	38	3	4	2	34	7	0	148
42	100	80	24	3	2	8	40	3	0	142
43	16	47	25	4	4	0	9	5	0	137
44	5	9	2	1	1	0	1	4	0	162
45	0	39	20	2	2	0	15	2	0	134
46	0	12	8	1	2	0	1	0	0	129
47	1	41	18	3	1	2	17	0	0	154
48	25	53	23	1	3	2	22	2	0	--
49	118	102	29	1	5	6	48	9	4	161
50	76	63	20	3	3	4	23	8	2	152
51	73	67	21	2	5	4	30	5	0	128
52	36	69	32	1	3	2	21	6	0	151
53	44	71	34	3	2	2	26	4	0	146
54	26	25	13	0	3	2	7	0	0	113
55	11	9	5	0	2	0	2	0	0	151
56	36	76	27	5	7	2	26	7	2	172
57	136	117	38	5	6	2	56	4	6	--
58	101	69	24	3	2	2	34	4	0	--
59	29	90	41	6	4	2	31	2	4	--
60	6	64	26	2	2	2	18	6	8	207
61	0	49	25	3	2	0	17	2	0	167
62	4	67	38	3	4	2	17	3	0	193
63	27	33	15	1	3	0	13	1	0	156
64	30	45	21	3	1	4	14	0	2	--
65	15	69	22	4	4	4	31	4	0	194
66	84	91	19	3	5	10	44	4	6	176
67	96	48	32	3	2	4	1	6	0	--
68	118	104	43	4	7	4	36	6	4	--
69	6	45	18	3	5	0	10	5	4	162
70	18	89	31	1	4	6	43	4	0	184
71	0	66	31	1	5	2	17	6	4	164
72	0	57	29	1	5	0	15	5	2	161
73	94	71	28	2	5	4	21	7	4	182
74	99	101	29	3	4	4	48	7	6	169
75	24	49	24	2	5	2	16	0	0	156
76	24	69	27	2	3	2	21	10	4	175
77	11	75	37	3	5	2	16	8	4	169
78	0	63	37	2	6	0	11	7	0	167
79	62	62	35	3	3	4	16	1	0	163
80	0	49	13	1	3	0	30	2	0	158
81	7	58	28	2	3	0	23	2	0	--
82	23	85	32	7	6	0	35	3	2	165
83	20	69	39	4	2	0	22	2	0	162
84	14	58	21	1	3	2	25	6	0	152
85	0	19	16	0	2	0	0	1	0	162

SCORES ON INDIVIDUAL-TESTS, MOSHER GROUP-TESTS, SEPARATE TESTS AND MENTAL AGE

[Continued]

Pupil	Individual Singing	Mosher Group (Composite)	Separate Tests							Mental Age
			1	2	3	4	5	6	7	
86	98	107	43	4	5	6	46	3	0	158
87	112	98	38	3	5	6	39	3	4	179
88	39	74	30	0	3	6	29	6	0	181
89	45	82	24	1	5	6	46	0	0	174
90	21	58	29	1	4	2	16	4	2	169
91	116	63	20	2	5	2	21	9	4	155
92	0	41	22	0	1	0	14	4	0	143
93	5	59	31	2	3	0	19	4	0	184
94	70	85	43	3	5	6	17	7	4	146
95	22	70	42	3	5	4	11	3	2	188
96	101	88	25	0	4	2	44	5	8	206
97	42	67	30	1	7	2	21	2	4	165
98	0	59	21	0	0	4	31	2	2	184
99	14	64	24	3	5	2	28	2	0	182
100	18	63	30	3	6	0	23	1	0	--
101	67	110	47	4	8	2	36	9	4	--
102	112	96	38	4	6	2	37	5	4	181
103	123	91	32	1	4	0	37	9	8	173
104	78	113	34	5	4	10	47	3	10	177
105	7	54	15	3	8	2	19	5	2	190
106	84	98	47	5	6	4	34	2	0	180
107	2	82	41	3	4	0	27	5	2	217
108	22	77	36	2	4	2	27	2	4	185
109	132	126	47	3	5	10	38	9	14	176
110	119	110	33	3	6	2	54	8	4	174
111	107	112	40	5	6	6	44	7	4	188
112	90	122	51	3	5	4	46	9	4	201
113	11	63	27	4	4	2	18	2	6	174
114	16	63	37	1	3	0	20	0	2	180
115	33	100	41	4	3	4	34	10	4	191
116	22	108	35	4	6	2	49	6	6	180
117	3	57	28	1	2	0	11	11	4	167
118	15	50	22	1	4	2	18	1	2	149
119	118	118	39	4	7	6	48	6	8	197
120	110	69	25	2	4	0	31	5	2	171
121	100	112	39	2	7	8	42	6	8	164
122	26	80	44	1	4	0	17	10	4	--
123	28	65	29	2	5	2	24	3	0	159
124	30	122	46	5	6	0	54	7	4	177
125	40	63	35	0	3	4	19	2	0	184
126	42	66	34	1	5	0	20	4	2	167
127	4	56	21	0	4	2	22	7	0	173
128	0	67	26	1	3	2	24	11	0	165

Mosher Sight Reading Music Test

NAME_____

BOY; GIRL (Underline)_____

AGE_____

BIRTHDAY_____

GRADE_____

SCHOOL_____

CITY_____

I HAVE TAKEN LESSONS IN_____ FOR_____ YEARS

I HAVE TAKEN PRIVATE LESSONS IN_____ FOR_____ YEARS

_____

Remarks:

TEST I

Look at the samples which are at the top of the page.

Samples:

The symbol 𝄽 is called (1) note; (2) bar; (3) slur; (4) sharp; (5) rest . . 5

The curved figure written on the staff is called (1) clef; (2) bar; (3) note; (4) rest; (5) pause 1

---

1. The mark means (1) repeat; (2) soften; (3) slow; (4) increase tone power; (5) suddenly loud . . . . . ____

2. **Presto** is a mark of expression meaning (1) sad; (2) slow; (3) like a march; (4) soft; (5) very quick. . . . . ____

3. The abbreviation *D. C.* means (1) diminish tone; (2) repeat from sign; (3) repeat from beginning; (4) sing an octave higher; (5) the end . . . . . ____

4. *mp* means (1) legato; (2) moderately soft; (3) loud; (4) louder; (5) very soft . . . . . ____

5. *sf* means (1) hold; (2) soft; (3) suddenly loud; (4) retard; (5) slow. . . . ____

6. 𝄐 means (1) hold; (2) breathe; (3) repeat from beginning; (4) rest; (5) increase speed. . . . . ____

7. 𝄆 means (1) repeat; (2) pause; (3) breathe; (4) rest; (5) staccato. . . . ____

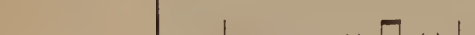
8. ∧ means (1) soft; (2) accent; (3) lightly; (4) loud; (5) slow . . . . . ____

9. Dots placed above notes mean the tones should be played or sung (1) smoothly; (2) in faster time; (3) forcefully; (4) short and crisp, (5) slowly . . . . . ____

10. *ff* means (1) fast; (2) legato; (3) very loud; (4) moderately soft; (5) very fast . . . . . ____

11. *p* is a mark of expression meaning (1) accented; (2) loud; (3) martial; (4) soft; (5) animated . . . . . ____

12. *dim.* is a mark of expression meaning (1) gradually faster; (2) suddenly soft; (3) gradually softer; (4) as soft as possible; (5) as fast as possible . . . . . ____

13.  . . ____

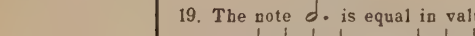
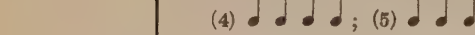
14. A dot placed after a note increases its value (1) one third; (2) one half; (3) one fourth; (4) one fifth; (5) one eighth . . . . . ____

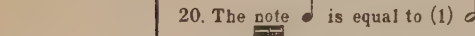
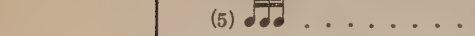
15. Three tones to one beat in $\frac{3}{8}$ measure would be represented by (1) . . . . . ____

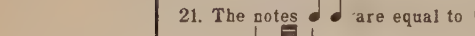
16. In $\frac{3}{8}$ measure, two tones to one beat are represented by (1) . . . . . ____

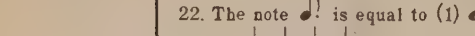
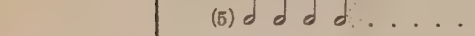
17. The sign designates a rest know as (1) whole; (2) half; (3) quarter; (4) eighth; (5) sixteenth . . . . . ____

18. The note is know as (1) quarter; (2) half; (3) eight; (4) sixteenth; (5) triplet . . . . . ____

19. The note  is equal in value to (1)  . . . . . ____

20. The note  is equal to (1)  . . . . . ____

21. The notes  are equal to (1) . . . . . ____

22. The note  is equal to (1)  . . . . . ____

23. Minor refers to a kind of (1) time; (2) rest; (3) tonality; (4) bar; (5) signature . . . . . ____

24. Triad is a kind of (1) scale; (2) chord; (3) progression; (4) phrase; (5) note . . . . . ____

25. Chromatic refers to (1) key signature; (2) intervals; (3) rhythm; (4) spaces; (5) sharps . . . . . ____

26. The number of tetra chords in a major scale is (1) one; (2) two; (3) three; (4) four; (5) five . . . . . ____

27. Accent which falls between beats is called (1) resolution; (2) enharmonic change; (3) syncopation; (4) diminuendo; (5) accelerando . . . .____

28. The scale composed entirely of half steps is called (1) whole tone; (2) natural minor; (3) chromatic; (4) major; (5) melodic minor . . . .____

29. Six-part measure may easily resolve to (1) two part; (2) three part; (3) four part; (4) five part; (5) seven part . . . . . .____

30. Transition from one key to another is called (1) anacrusis; (2) modulation; (3) suspension; (4) transposition; (5) progression . . . . . .____

31. Sub-dominant is a kind of (1) interval; (2) chord; (3) slur; (4) double sharp; (5) tempo . . . . . .____

32. is known as the (1) F clef; (2) G clef; (3) E clef; (4) D clef; (5) C clef. . . . . .____

33. The added line above the bass staff represents the pitch (1) D; (2) middle C; (3) high F; (4) low G; (5) high E . . . . . .____

34. Between one and two of the major scale, the distance by steps is (1) one whole; (2) one half; (3) one and one half; (4) two steps; (5) two and one half steps. . . . . .____

35. Intervals are named from (1) the number of staff degrees included; (2) number of half steps included; (3) impression on hearer; (4) number of whole steps included; (5) number of notes included . . . . .____

36. A half step is (1) D to E; (2) A to B; (3) B to C; (4) F to G; (5) C to D . . . . . .____

37. Dominant is a kind of (1) mark of expression; (2) measure sign; (3) chord; (4) interval; (5) rest . . . . . .____

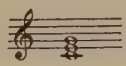
38. Harmonic is a form of (1) interval; (2) pulse; (3) note; (4) scale; (5) chord . . . . . .____

39. The second line of treble staff is (1) E; (2) F; (3) G; (4) A; (5) B. . . . . .____

40. The fifth line of treble staff is (1) E; (2) F; (3) G; (4) A; (5) B. . . . . .____

41. The most essential element in music is (1) tone; (2) rhythm; (3) notes; (4) staff; (5) bars . . . . . .____

42. The third line of the bass staff is (1) G; (2) A; (3) B; (4) C; (5) D . . . . . .——

43.  The notes on this staff represent (1) an interval; (2) phrase; (3) tie; (4) chord; (5) line. . . . . .——

44. "One" of the major scale sounds best when played or sung with (1) 7; (2) 4; (3) one sharp; (4) 3; (5) 5 . . . . . .——

45. Haydn is the name of (1) an opera; (2) folk song; (3) mark of expression; (4) symphony writer; (5) dance . . . . . .——

46. Tempo refers to (1) beats in measure; (2) signature; (3) rhythmic pattern; (4) space names; (5) speed of singing . . . . . .——

47. Notes indicate (1) pitch only; (2) tempo; (3) rhythm only; (4) both pitch and duration; (5) accent . . . . . .——

48. Il Trovatore is a well known (1) symphony; (2) sonata; (3) cantata; (4) opera; (5) chorus. . . . . .——

49. Arias are parts of (1) symphonies; (2) measures; (3) operas; (4) orchestra; (5) signatures . . . . . .——

50. Alto is a quality of (1) voice; (2) tone; (3) emphasis; (4) brace; (5) chord. . . . . .——

51. "Flatting the pitch" refers to (1) accidentals; (2) flexibility of jaw; (3) singing too slowly; (4) singing out of tune; (5) transposition . . .——

52. The lines of the so called Great Staff numbered (1) five; (2) eight; (3) eleven; (4) thirteen; (5) fifteen . . . . . .——

53. A polka is a kind of (1) musical instrument; (2) dance; (3) clef; (4) mark of expression; (5) progression . . . . . .——

54. A trio is usually sung by (1) three; (2) four; (3) five; (4) six; (5) two persons . . . . . .——

55. The style of folk music is usually (1) intellectual; (2) simple; (3) contrapuntal; (4) church-like; (5) formal . . . . . .——

56. Waltz time is usually in (1) 2; (2) 3; (3) 4; (4) 5; (5) 6 part measure . . . . . .——

57. An air most resembles a (1) staff; (2) note; (3) melody; (4) chord; (5) cadence. . . . . .——

58. Soprano is a kind of (1) voice; (2) scale; (3) staff degree; (4) meter; (5) anticipation . . . . . .——

59. Bass is usually sung by (1) girls; (2) elderly women; (3) boys; (4) men; (5) babies . . . . . ____

60. Intelligent singing depends mostly on (1) key signature; (2) double bars; (3) accidentals; (4) manner of phrasing; (5) meter. . . . . ____

61. Good attack in singing refers to (1) manner of beginning; (2) ending; (3) speed; (4) expression, (5) pause . . . . . ____

62. Timbre in music refers to (1) quality of tone; (2) speed of singing; (3) number of rests; (4) period of pause; (5) quickness of attack . . . ____

63. Tenor refers to (1) place on staff; (2) key signature; (3) quality of voice; (4) beats in measure; (5) kind of phrase . . . . . ____

64. In $\frac{6}{8}$ measure the accent usually falls on beats (1) 1 and 2; (2) 2 and 3; (3) 1 and 5; (4) 1 and 4; (5) 3 and 6 . . . . . ____

65. In $\frac{3}{4}$ measure, the accent occurs on beat (1) 1; (2) 2; (3) 3; (4) 4; (5) 5 . . ____

66. In $\frac{4}{4}$ measure, the accent occurs on (1) 1 and 2; (2) 2 and 4; (3) 1 and 3; (4) 3 and 4; (5) 1 and 4. . . . . ____

67. Six-part measure may easily resolve to (1) two part; (2) three part; (3) four part; (4) five part; (5) seven part . . . . . ____

68. The words—"The King of France with forty thousand men
Marched up the hill, and then marched down again."
would be best expressed in measure-signature (1) $\frac{2}{4}$; (2) $\frac{3}{4}$; (3) $\frac{3}{8}$; (4) $\frac{6}{8}$; (5) $\frac{3}{2}$ . . ____

(What measure-signature would best fit the following lines?
Put your answer on the line at the left of each selection.)

____ 69. Come down to Kew in lilac time, in lilac time, in lilac time;
Come down to Kew in lilac time, it isn't far from London.

____ 70. Up with me! up with me into the clouds!
For thy song, Lark, is strong;
Up with me! up with me into the clouds!

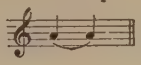
____ 71. How would you like to go up in a swing,
Up in a swing so high?

____ 72. Bright is the diadem, boundless the sway.

____ 73. That orbed maiden with white fire laden,
Whom mortals call the moon
Glides glimmering o'er my fleece-like floor,
By the midnight breezes strewn.

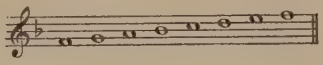
TEST II

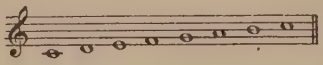
Look at the sample:

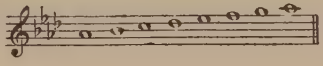


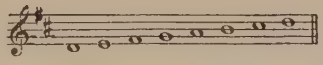
The name of the curved line which connects two notes on the same staff degree is a . . . . tie

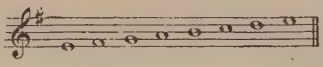
Below you will see some questions to be answered on this page. If you do not know the answer to a question, go on to the next and do the best you can. Do No. 1 first, then No. 2, and so on down the page until I say *"Stop!"*

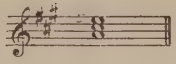
1.  With one flat in the signature, the name of the scale is . . _____

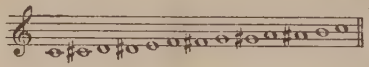
2.  With no sharps or flats in the signature, the name of the scale is _____

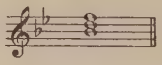
3.  With four flats in the signature, the name of the scale is . . _____

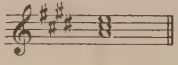
4.  With two sharps in the signature, the name of the scale is _____

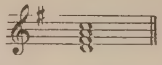
5.  With one sharp in the signature; when the scale begins on E, the mode is called . . . . . _____

6.  This chord is in the key of A Major. The name of the chord is . . . . _____

7.  This scale ascends by half steps. The name of the scale is . _____

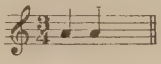
8.  This chord is in the key of B flat Major. The name of the chord is . . . . . _____

9.  This chord is in the key of E Major. The name of the chord is . . . . . _____

10.  This chord is in the key of G Major. The name of the chord is . . . . . _____

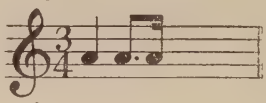
TEST III

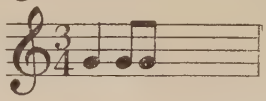
Look at the sample at the top of the page. Do what the examiner tells you with that sample.

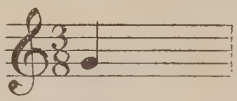
Sample: 

1. Complete the measure with one note . . . . .

2. Complete the measure with two notes. . . . .

3. Complete the measure with two notes . . . . 

4. Complete the measure with three notes. . . . 

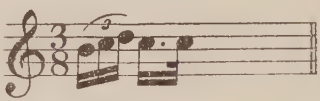
5. Complete the measure with three notes. . . . . 

6. Complete the measure with one note. . . . .

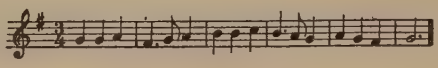
7. Complete the measure with one note . . . . .

8. Complete the measure with two notes . . . .

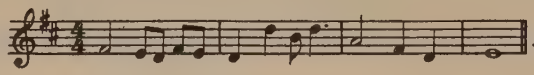
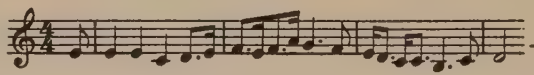
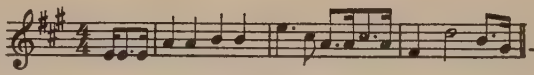
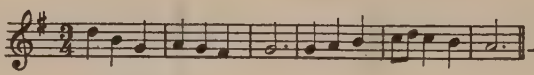
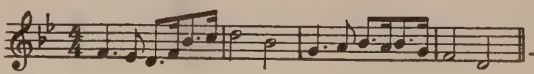
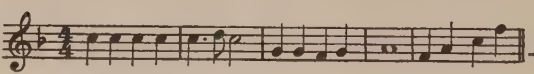
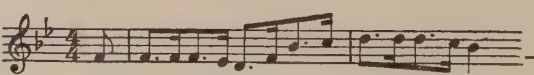
9. Complete the measure with one note. .

10. Complete the measure using one dotted note and one other note of your own choice. . 

TEST IV

Sample  *America*

Write the names of the following melodies on the lines on the right as in the sample.

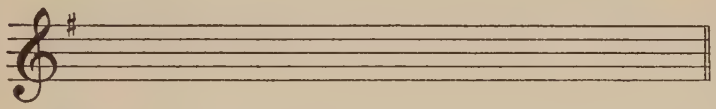
1.
2. 
3. 
4. 
5. 
6. 
7. 
8. 

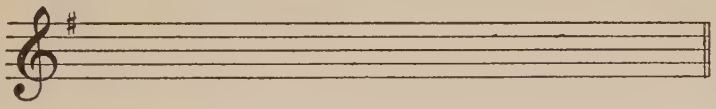
TEST V

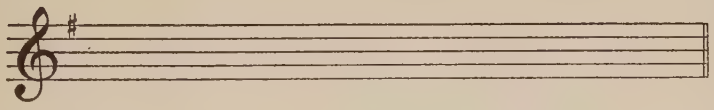
Listen carefully to the examiner and do what he tells you to do.

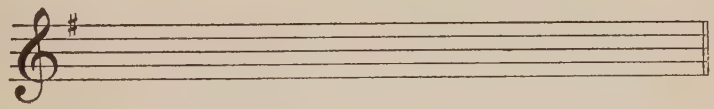
Sample

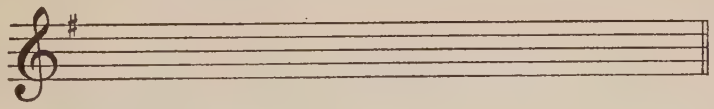
1.

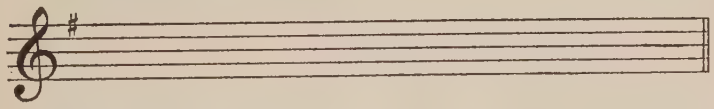
2. 

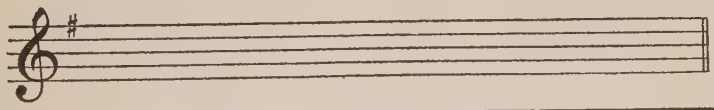
3. 

4. 

5. 

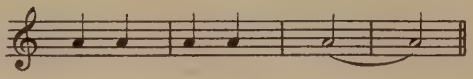
6. 

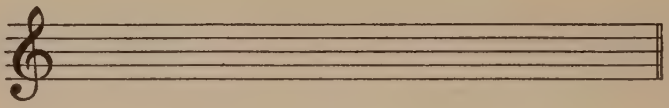
7. 

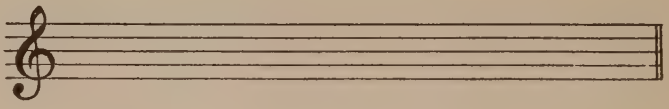
8. 

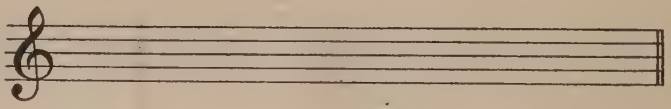
TEST VI

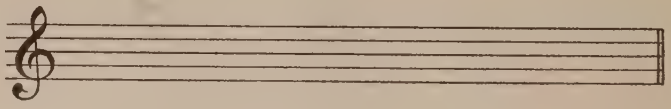
Listen carefully to the examiner and do what he tells you to do.

Sample 

1. 

2. 

3. 

4. 

5.

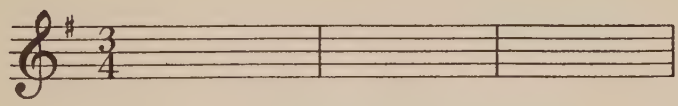
TEST VII

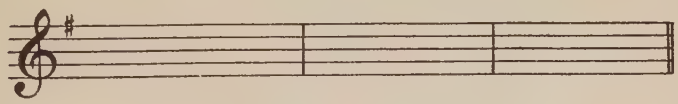
Listen carefully to the examiner and do what he tells you to do.

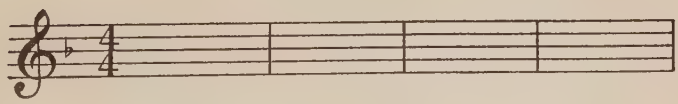
Sample

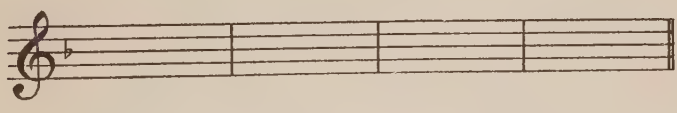
1.

2.

3. 



4 



VITA

Raymond M. Mosher was born on May 9, 1894, at Palo Alto, California. He was graduated from the Palo Alto Grammar School in 1908 and from the Mountain View High School in 1912. He attended the State Teachers College at San Jose, California, receiving the general elementary diploma and a special diploma in music in 1914. The A.B. and A.M. degrees were acquired at Leland Stanford Junior University in 1919 and 1923, respectively, with a major in the Department of Education.

He studied piano under Mrs. Alberta Whisman Baker (a pupil of Leschetizky) in San Francisco for ten years. Later, in 1921, he was a student at the Conservatoire Américain, Fontainebleau, France, under the French masters, Philippe, Hérard, and Motte-Lacroix.

From 1914–1919, he was instructor in harmony, history of music, and piano at the State Teachers College at San Jose, California. Subsequently, he held the directorship of music at the State Teachers College, Santa Barbara, California, from 1919 to 1922. In September, 1924, he was appointed director of experimental education and instructor in educational psychology at the State Normal School, New Haven, Conn.